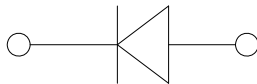
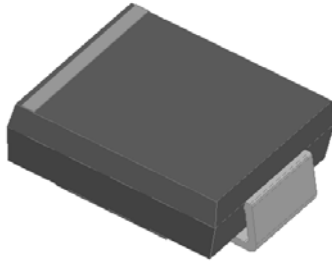
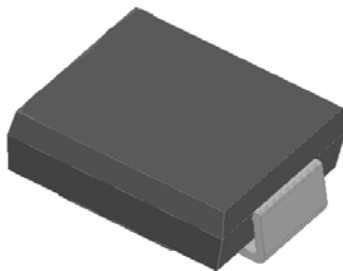


## Surface Mount Transient Voltage Suppressor Diodes

### Uni-directional



### Bi-directional



### Features

- Low profile package
- Ideal for automated placement
- Available in Uni-directional and Bi-directional
- 1500W peak pulse power capability with a 10/1000  $\mu$ s waveform
- Excellent clamping capability
- Fast response time: typically less than 1.0ns from 0V to VBR min
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020C, LF maximum peak of 260 °C
- ESD protection of data lines in accordance with IEC 61000-4-2, 30kV(Air), 30kV (Contact)
- Part no. with suffix "Q" means AEC-Q101 qualified

### Typical Applications

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, automotive, telecommunication.

### Mechanical Data

- **Package:** DO-214AB (SMC)  
Molding compound meets UL 94 V-0 flammability rating, RoHS-compliant, halogen-free
- **Terminals:** Matte tin plated leads, solderable per J-STD-002 and JESD22-B102
- **Polarity:** For uni-directional types the band denotes cathode end, no marking on bi-directional types

### ■Maximum Ratings ( $T_a=25^\circ\text{C}$ Unless otherwise specified)

| PARAMETER                                                                                   | SYMBOL    | UNIT             | Max            |
|---------------------------------------------------------------------------------------------|-----------|------------------|----------------|
| Peak power dissipation, with a 10/1000us waveform <sup>(1) (2)</sup>                        | $P_{PPM}$ | W                | 1500           |
| Peak pulse current, with a 10/1000us waveform <sup>(1)</sup>                                | $I_{PPM}$ | A                | See Next Table |
| Power dissipation, on infinite heat sink at $T_L=75^\circ\text{C}$ <sup>(2)</sup>           | $P_D$     | W                | 6.5            |
| Peak forward surge current, 8.3 ms single half sine-wave unidirectional only <sup>(3)</sup> | $I_{FSM}$ | A                | 200            |
| Operating junction                                                                          | $T_J$     | $^\circ\text{C}$ | -55 to +175    |
| Storage temperature range                                                                   | $T_{STG}$ | $^\circ\text{C}$ | -55 to +175    |

### ■Electrical Characteristics ( $T_a=25^\circ\text{C}$ Unless otherwise specified)

| PARAMETER                                                                            | SYMBOL   | UNIT | VALUE |
|--------------------------------------------------------------------------------------|----------|------|-------|
| Maximum instantaneous forward voltage at 100A for unidirectional only <sup>(4)</sup> | $V_{FM}$ | V    | 3.5   |



# SMCJ5.0AQ THRU SMCJ190CAQ

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

| Part Number<br>(Uni) | Part Number<br>(Bi)       | Breakdown Voltage $V_{BR}@I_T$ |         |                  | Maximum<br>Reverse<br>Leakage $I_R^{(6)}$<br>@ $V_{RWM}$ ( $\mu A$ ) | Working Peak<br>Reverse<br>Voltage<br>$V_{RWM}$ (V) | Maximum<br>Reverse Surge<br>Current $I_{PP}^{(7)}$<br>(A) | Maximum<br>Clamping<br>Voltage $V_C$<br>@ $I_{PP}$<br>(V) |
|----------------------|---------------------------|--------------------------------|---------|------------------|----------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
|                      |                           | Min(V)                         | Max (V) | $I_T^{(5)}$ (mA) |                                                                      |                                                     |                                                           |                                                           |
| SMCJ5.0AQ            | SMCJ5.0CAQ <sup>(8)</sup> | 6.4                            | 7.07    | 10               | 1000                                                                 | 5                                                   | 163.0                                                     | 9.2                                                       |
| SMCJ6.0AQ            | SMCJ6.0CAQ                | 6.67                           | 7.37    | 10               | 1000                                                                 | 6                                                   | 145.6                                                     | 10.3                                                      |
| SMCJ6.5AQ            | SMCJ6.5CAQ                | 7.22                           | 7.98    | 10               | 500                                                                  | 6.5                                                 | 133.9                                                     | 11.2                                                      |
| SMCJ7.0AQ            | SMCJ7.0CAQ                | 7.78                           | 8.6     | 10               | 200                                                                  | 7                                                   | 125.0                                                     | 12                                                        |
| SMCJ7.5AQ            | SMCJ7.5CAQ                | 8.33                           | 9.21    | 1                | 100                                                                  | 7.5                                                 | 116.3                                                     | 12.9                                                      |
| SMCJ8.0AQ            | SMCJ8.0CAQ                | 8.89                           | 9.83    | 1                | 50                                                                   | 8                                                   | 110.3                                                     | 13.6                                                      |
| SMCJ8.5AQ            | SMCJ8.5CAQ                | 9.44                           | 10.4    | 1                | 20                                                                   | 8.5                                                 | 104.2                                                     | 14.4                                                      |
| SMCJ9.0AQ            | SMCJ9.0CAQ                | 10                             | 11.1    | 1                | 10                                                                   | 9                                                   | 97.4                                                      | 15.4                                                      |
| SMCJ10AQ             | SMCJ10CAQ                 | 11.1                           | 12.3    | 1                | 5                                                                    | 10                                                  | 88.24                                                     | 17                                                        |
| SMCJ11AQ             | SMCJ11CAQ                 | 12.20                          | 13.50   | 1                | 5                                                                    | 11.0                                                | 82.4                                                      | 18.2                                                      |
| SMCJ12AQ             | SMCJ12CAQ                 | 13.30                          | 14.70   | 1                | 5                                                                    | 12.0                                                | 75.4                                                      | 19.9                                                      |
| SMCJ13AQ             | SMCJ13CAQ                 | 14.40                          | 15.90   | 1                | 1                                                                    | 13.0                                                | 69.8                                                      | 21.5                                                      |
| SMCJ14AQ             | SMCJ14CAQ                 | 15.60                          | 17.20   | 1                | 1                                                                    | 14.0                                                | 64.7                                                      | 23.2                                                      |
| SMCJ15AQ             | SMCJ15CAQ                 | 16.70                          | 18.50   | 1                | 1                                                                    | 15.0                                                | 61.5                                                      | 24.4                                                      |
| SMCJ16AQ             | SMCJ16CAQ                 | 17.80                          | 19.70   | 1                | 1                                                                    | 16.0                                                | 57.7                                                      | 26.0                                                      |
| SMCJ17AQ             | SMCJ17CAQ                 | 18.90                          | 20.90   | 1                | 1                                                                    | 17.0                                                | 54.4                                                      | 27.6                                                      |
| SMCJ18AQ             | SMCJ18CAQ                 | 20.00                          | 22.10   | 1                | 1                                                                    | 18.0                                                | 51.4                                                      | 29.2                                                      |
| SMCJ19AQ             | SMCJ19CAQ                 | 21.10                          | 23.30   | 1                | 1                                                                    | 19.0                                                | 48.7                                                      | 30.8                                                      |
| SMCJ20AQ             | SMCJ20CAQ                 | 22.20                          | 24.50   | 1                | 1                                                                    | 20.0                                                | 46.3                                                      | 32.4                                                      |
| SMCJ22AQ             | SMCJ22CAQ                 | 24.40                          | 26.90   | 1                | 1                                                                    | 22.0                                                | 42.3                                                      | 35.5                                                      |
| SMCJ24AQ             | SMCJ24CAQ                 | 26.70                          | 29.50   | 1                | 1                                                                    | 24.0                                                | 38.6                                                      | 38.9                                                      |
| SMCJ26AQ             | SMCJ26CAQ                 | 28.90                          | 31.90   | 1                | 1                                                                    | 26.0                                                | 35.6                                                      | 42.1                                                      |
| SMCJ28AQ             | SMCJ28CAQ                 | 31.10                          | 34.40   | 1                | 1                                                                    | 28.0                                                | 33.0                                                      | 45.4                                                      |
| SMCJ30AQ             | SMCJ30CAQ                 | 33.30                          | 36.80   | 1                | 1                                                                    | 30.0                                                | 31.0                                                      | 48.4                                                      |
| SMCJ33AQ             | SMCJ33CAQ                 | 36.70                          | 40.60   | 1                | 1                                                                    | 33.0                                                | 28.1                                                      | 53.3                                                      |
| SMCJ36AQ             | SMCJ36CAQ                 | 40.00                          | 44.20   | 1                | 1                                                                    | 36.0                                                | 25.8                                                      | 58.1                                                      |
| SMCJ40AQ             | SMCJ40CAQ                 | 44.40                          | 49.10   | 1                | 1                                                                    | 40.0                                                | 23.3                                                      | 64.5                                                      |



## SMCJ5.0AQ THRU SMCJ190CAQ

|           |            |       |       |   |   |      |      |       |
|-----------|------------|-------|-------|---|---|------|------|-------|
| SMCJ43AQ  | SMCJ43CAQ  | 47.80 | 52.80 | 1 | 1 | 43.0 | 21.6 | 69.4  |
| SMCJ45AQ  | SMCJ45CAQ  | 50.00 | 55.30 | 1 | 1 | 45.0 | 20.6 | 72.7  |
| SMCJ48AQ  | SMCJ48CAQ  | 53.30 | 58.90 | 1 | 1 | 48.0 | 19.4 | 77.4  |
| SMCJ51AQ  | SMCJ51CAQ  | 56.7  | 62.7  | 1 | 1 | 51   | 18.2 | 82.4  |
| SMCJ54AQ  | SMCJ54CAQ  | 60    | 66.3  | 1 | 1 | 54   | 17.2 | 87.1  |
| SMCJ58AQ  | SMCJ58CAQ  | 64.4  | 71.2  | 1 | 1 | 58   | 16.0 | 93.6  |
| SMCJ60AQ  | SMCJ60CAQ  | 66.7  | 73.7  | 1 | 1 | 60   | 15.5 | 96.8  |
| SMCJ64AQ  | SMCJ64CAQ  | 71.1  | 78.6  | 1 | 1 | 64   | 14.6 | 103   |
| SMCJ70AQ  | SMCJ70CAQ  | 77.8  | 86    | 1 | 1 | 70   | 13.3 | 113   |
| SMCJ75AQ  | SMCJ75CAQ  | 83.3  | 92.1  | 1 | 1 | 75   | 12.4 | 121   |
| SMCJ78AQ  | SMCJ78CAQ  | 86.7  | 95.8  | 1 | 1 | 78   | 11.9 | 126   |
| SMCJ80AQ  | SMCJ80CAQ  | 88.8  | 97.6  | 1 | 1 | 80   | 11.6 | 129.6 |
| SMCJ85AQ  | SMCJ85CAQ  | 94.4  | 104   | 1 | 1 | 85   | 10.9 | 137   |
| SMCJ90AQ  | SMCJ90CAQ  | 100   | 111   | 1 | 1 | 90   | 10.3 | 146   |
| SMCJ100AQ | SMCJ100CAQ | 111   | 123   | 1 | 1 | 100  | 9.3  | 162   |
| SMCJ110AQ | SMCJ110CAQ | 122   | 135   | 1 | 1 | 110  | 8.5  | 177   |
| SMCJ120AQ | SMCJ120CAQ | 133   | 147   | 1 | 1 | 120  | 7.8  | 193   |
| SMCJ130AQ | SMCJ130CAQ | 144   | 159   | 1 | 1 | 130  | 7.2  | 209   |
| SMCJ140AQ | SMCJ140CAQ | 155   | 171   | 1 | 1 | 140  | 6.6  | 226.8 |
| SMCJ150AQ | SMCJ150CAQ | 167   | 185   | 1 | 1 | 150  | 6.2  | 243   |
| SMCJ160AQ | SMCJ160CAQ | 178   | 197   | 1 | 1 | 160  | 5.8  | 259   |
| SMCJ170AQ | SMCJ170CAQ | 189   | 209   | 1 | 1 | 170  | 5.5  | 275   |
| SMCJ180AQ | SMCJ180CAQ | 200   | 220   | 1 | 1 | 180  | 5.1  | 291.6 |
| SMCJ190AQ | SMCJ190CAQ | 211   | 232   | 1 | 1 | 190  | 4.9  | 307.8 |

### ■ Thermal Characteristics (Ta=25°C Unless otherwise specified)

| PARAMETER                   | SYMBOL                | UNIT | Conditions          | VALUE |
|-----------------------------|-----------------------|------|---------------------|-------|
| Thermal Resistance(Typical) | $R_{\theta JA}^{(9)}$ | °C/W | junction to ambient | 75    |
|                             | $R_{\theta JL}$       | °C/W | junction to lead    | 15    |

Notes:

- (1) Non-repetitive current pulse, per Fig.3 and derated above  $T_J = 50^\circ\text{C}$  per Fig.2.
- (2) Mounted on 0.31 x 0.31" (8.0 x 8.0 mm) copper pads to each terminal
- (3) Measured on 8.3ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum.
- (4)  $V_F=3.5\text{V}$  Max for devices of  $V_{BR} \leq 220\text{V}$ .
- (5) Pulse Test:  $t_p \leq 50\text{ms}$ .



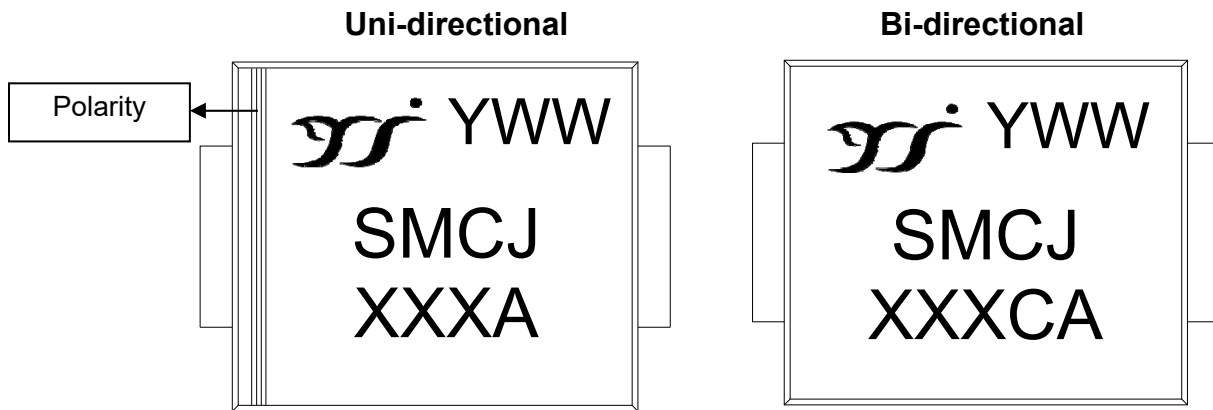
## SMCJ5.0AQ THRU SMCJ190CAQ

- (6) For bi-directional types having  $V_{RWM}$  of 10 V and less, the IR limit is doubled.
- (7) Surge current waveform per Fig.3 and derated per Fig.2.
- (8) For the bi-directional SMCJ5.0CAQ, the maximum  $V_{BR}$  is 7.25 V.
- (9) Mounted on minimum recommended pad layout.

### ■ Ordering Information (Example)

| PREFERRED P/N | PACKAGE CODE | UNIT WEIGHT(g)    | MINIMUM PACKAGE(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|-------------------|----------------------|----------------------------|---------------|
| SMCJ SERIES   | F1           | Approximate 0.257 | 3000                 | 42000                      | 13" reel      |

### ■ Marking Information



**Note:**

- 1. All marking is at middle of the product body
- 2. All marking is in laser printing
- 3. XXX is marking code, like 190A/190CA marking code is 190
- 4. Body color: Black
- 5. YWW is date code, "Y" is year. "WW" is week.

**For instance:**

The 17<sup>th</sup> week of 2021, date code is 117

The 17<sup>th</sup> week of 2022, date code is 217

### ■ Characteristics(Typical)

Fig.1 Peak Pulse Power Rating Curve

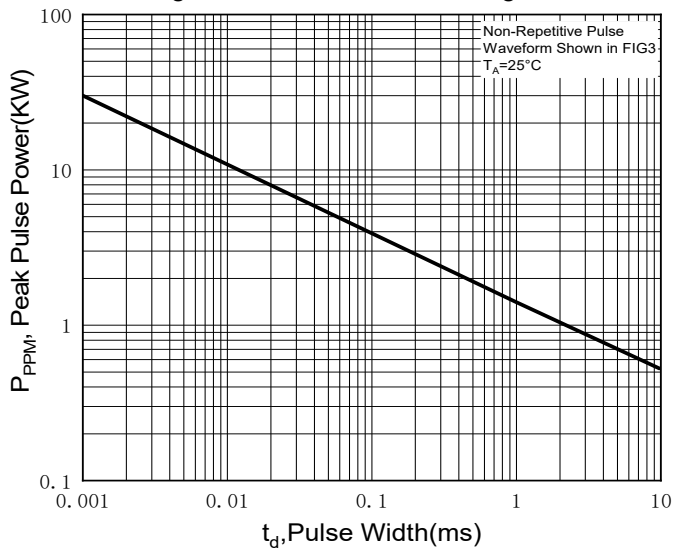
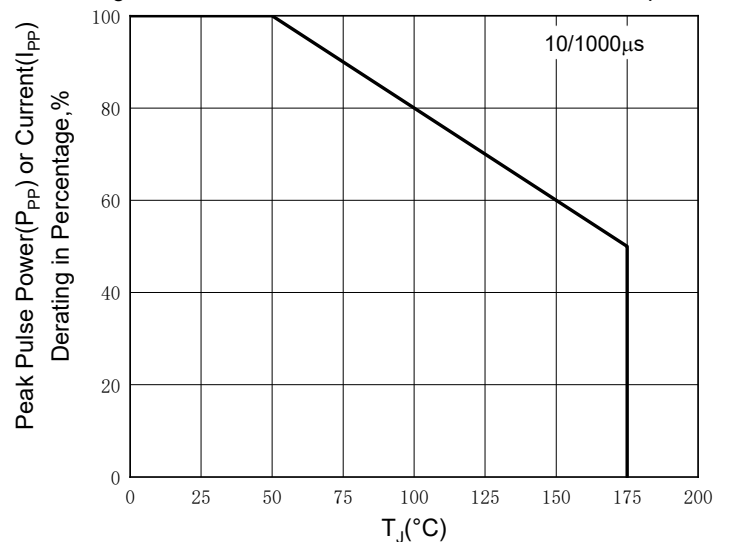


Fig.2 Pulse Power or Current vs. Initial Junction Temperature





## SMCJ5.0AQ THRU SMCJ190CAQ

Fig.3 Pulse Waveform

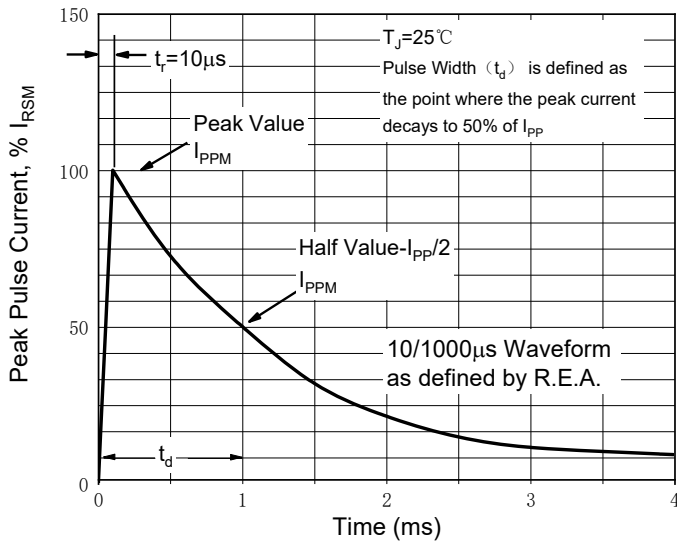


Fig.4 Typical Transient Thermal Impedance

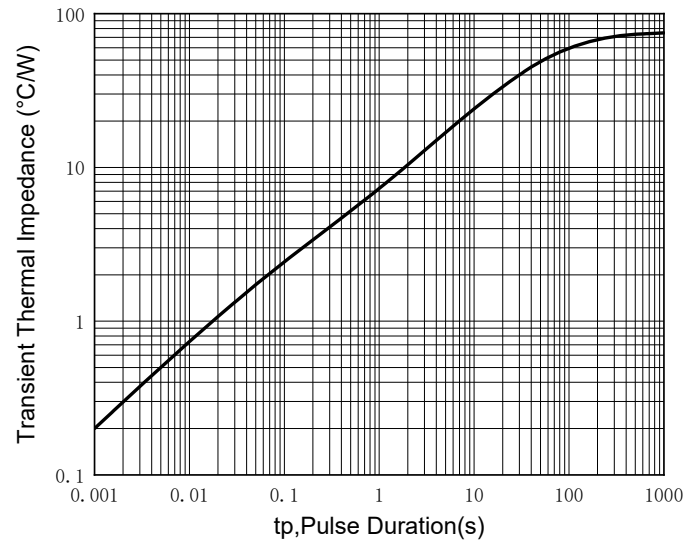


Fig.5 Maximum Non-Repetitive Forward Surge Current

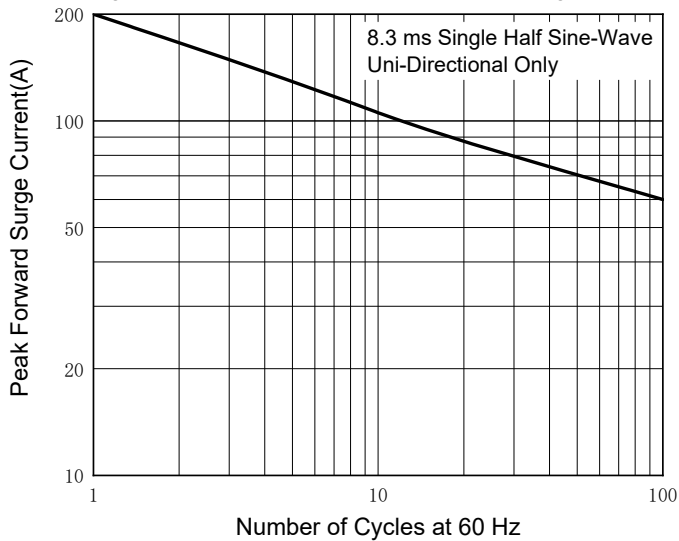
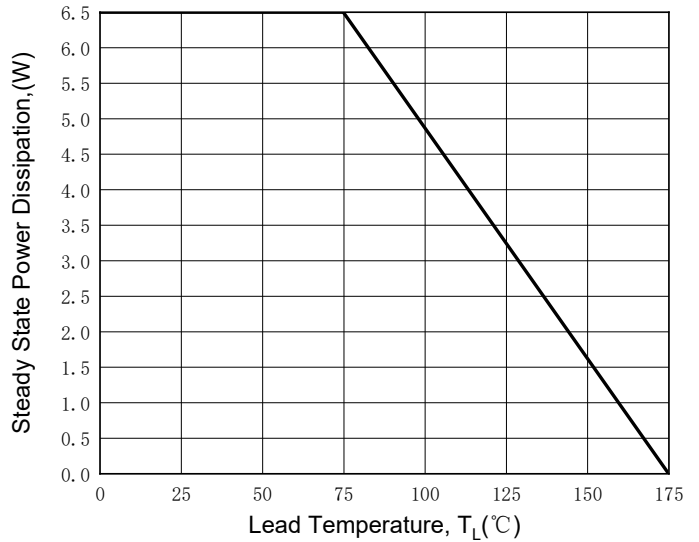
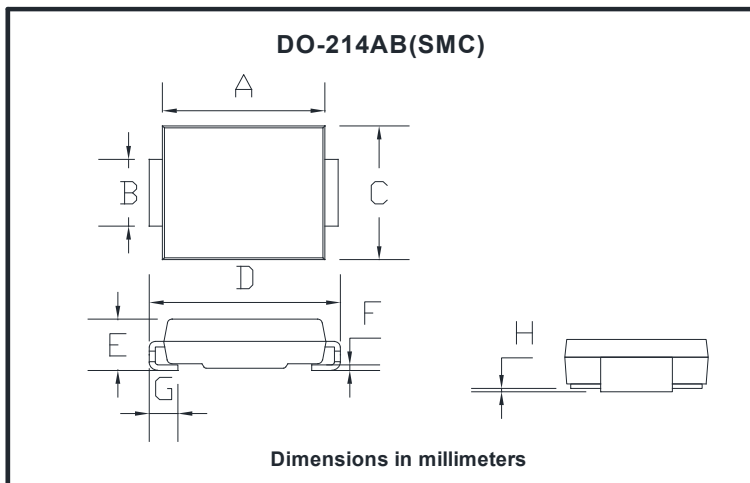


Fig.6 Steady State Power Derating Curve



### ■ Outline Dimensions

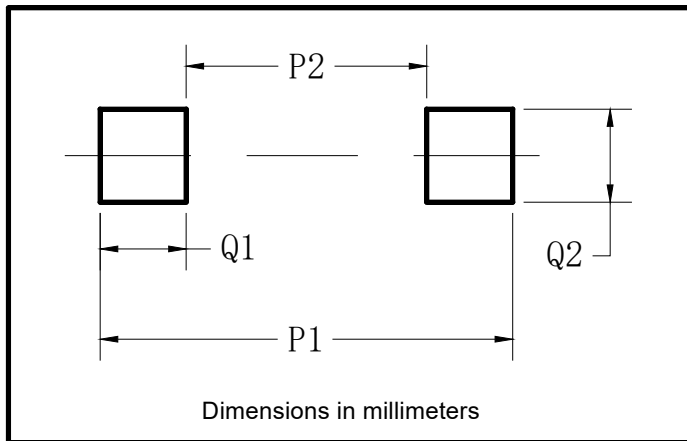


| DO-214AB (SMC) |      |      |
|----------------|------|------|
| Dim            | Min  | Max  |
| A              | 6.60 | 7.11 |
| B              | 2.85 | 3.27 |
| C              | 5.59 | 6.22 |
| D              | 7.75 | 8.13 |
| E              | 1.99 | 2.61 |
| F              | 0.15 | 0.31 |
| G              | 0.76 | 1.52 |
| H              | 0.05 | 0.20 |



## SMCJ5.0AQ THRU SMCJ190CAQ

### ■ Suggested pad layout



| Dim | Typ  |
|-----|------|
| P1  | 9.9  |
| P2  | 3.84 |
| Q1  | 3.03 |
| Q2  | 3.82 |



## SMCJ5.0AQ THRU SMCJ190CAQ

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### Disclaimer

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