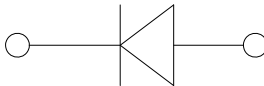


## Surface Mount Transient Voltage Suppressor Diodes

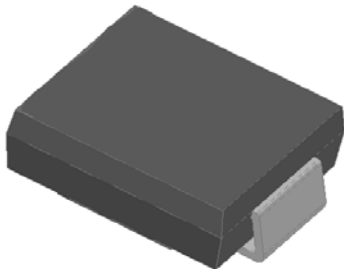
### Uni-directional



### 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
- Low incremental surge resistance
- Very fast response time
- Meets MSL level 1, per J-STD-020, 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

### Bi-directional



### Typical Applications

For 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, automotive and telecommunication.

### Mechanical Data

- **Package:** DO-214AB (SMC)  
Molding compound meets UL 94 V-0 flammability rating, RoHS-compliant
- **Terminals:** 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             | Conditions                                       | Max            |
|---|-----------|------------------|--|----------------|
| Peak power dissipation <sup>(1)(2)</sup>  | $P_{PPM}$ | W                | with a 10/1000us waveform                        | 1500           |
| Peak pulse current <sup>(1)</sup>         | $I_{PPM}$ | A                | with a 10/1000us waveform                        | See Next Table |
| Power dissipation <sup>(2)</sup>          | $P_D$     | W                | on infinite heat sink at $T_L=75^\circ\text{C}$  | 6.5            |
| Peak forward surge current <sup>(3)</sup> | $I_{FSM}$ | A                | 8.3 ms single half sine-wave unidirectional only | 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   |



# 1.5SMC6.8AQ THRU 1.5SMC220CAQ

## ■Electrical Characteristics (TA=25°C unless otherwise noted)

| Part Number (Uni) | Part Number (Bi) | Breakdown Voltage $V_{BR@I_T}$ |         |                  | Maximum Reverse Leakage $I_R^{(3)}$ @ $V_{RWM}$ ( $\mu A$ ) | Working Peak Reverse Voltage $V_{RWM}$ (V) | Maximum Reverse Surge Current $I_{PP}^{(6)}$ (A) | Maximum Clamping Voltage $V_c$ @ $I_{PP}$ (V) |
|-------------------|------------------|--------------------------------|---------|------------------|---|--|--|---|
|                   |                  | Min(V)                         | Max (V) | $I_T^{(5)}$ (mA) |   |  |  |   |
| 1.5SMC6.8AQ       | 1.5SMC6.8CAQ     | 6.46                           | 7.14    | 10               | 1000  | 5.8  | 142.9  | 10.5  |
| 1.5SMC7.5AQ       | 1.5SMC7.5CAQ     | 7.13                           | 7.88    | 10               | 500   | 6.4  | 132.7  | 11.3  |
| 1.5SMC8.2AQ       | 1.5SMC8.2CAQ     | 7.79                           | 8.61    | 10               | 200   | 7.0  | 124.9  | 12.1  |
| 1.5SMC9.1AQ       | 1.5SMC9.1CAQ     | 8.65                           | 9.56    | 1                | 50  | 7.8  | 111.9  | 13.4  |
| 1.5SMC10AQ        | 1.5SMC10CAQ      | 9.50                           | 10.50   | 1                | 10  | 8.6  | 103.5  | 14.5  |
| 1.5SMC11AQ        | 1.5SMC11CAQ      | 10.45                          | 11.55   | 1                | 5   | 9.4  | 96.2   | 15.6  |
| 1.5SMC12AQ        | 1.5SMC12CAQ      | 11.40                          | 12.60   | 1                | 5   | 10.2                                       | 89.8   | 16.7  |
| 1.5SMC13AQ        | 1.5SMC13CAQ      | 12.35                          | 13.65   | 1                | 5   | 11.1                                       | 82.4   | 18.2  |
| 1.5SMC15AQ        | 1.5SMC15CAQ      | 14.25                          | 15.75   | 1                | 1   | 12.8                                       | 70.8   | 21.2  |
| 1.5SMC16AQ        | 1.5SMC16CAQ      | 15.20                          | 16.80   | 1                | 1   | 13.6                                       | 66.7   | 22.5  |
| 1.5SMC18AQ        | 1.5SMC18CAQ      | 17.10                          | 18.90   | 1                | 1   | 15.3                                       | 59.5   | 25.2  |
| 1.5SMC20AQ        | 1.5SMC20CAQ      | 19.00                          | 21.00   | 1                | 1   | 17.1                                       | 54.2   | 27.7  |
| 1.5SMC22AQ        | 1.5SMC22CAQ      | 20.90                          | 23.10   | 1                | 1   | 18.8                                       | 49.0   | 30.6  |
| 1.5SMC24AQ        | 1.5SMC24CAQ      | 22.80                          | 25.20   | 1                | 1   | 20.5                                       | 45.2   | 33.2  |
| 1.5SMC27AQ        | 1.5SMC27CAQ      | 25.65                          | 28.35   | 1                | 1   | 23.1                                       | 40.0   | 37.5  |
| 1.5SMC30AQ        | 1.5SMC30CAQ      | 28.50                          | 31.50   | 1                | 1   | 25.6                                       | 36.2   | 41.4  |
| 1.5SMC33AQ        | 1.5SMC33CAQ      | 31.35                          | 34.65   | 1                | 1   | 28.2                                       | 32.8   | 45.7  |
| 1.5SMC36AQ        | 1.5SMC36CAQ      | 34.20                          | 37.80   | 1                | 1   | 30.8                                       | 30.1   | 50.0  |
| 1.5SMC39AQ        | 1.5SMC39CAQ      | 37.05                          | 40.95   | 1                | 1   | 33.3                                       | 27.8   | 53.9  |
| 1.5SMC43AQ        | 1.5SMC43CAQ      | 40.85                          | 45.15   | 1                | 1   | 36.8                                       | 25.3   | 59.3  |
| 1.5SMC47AQ        | 1.5SMC47CAQ      | 44.65                          | 49.35   | 1                | 1   | 40.2                                       | 23.2   | 64.8  |
| 1.5SMC51AQ        | 1.5SMC51CAQ      | 48.45                          | 53.55   | 1                | 1   | 43.6                                       | 21.4   | 70.1  |
| 1.5SMC56AQ        | 1.5SMC56CAQ      | 53.20                          | 58.80   | 1                | 1   | 47.8                                       | 19.5   | 77.0  |
| 1.5SMC62AQ        | 1.5SMC62CAQ      | 58.90                          | 65.10   | 1                | 1   | 53.0                                       | 17.7   | 85.0  |
| 1.5SMC68AQ        | 1.5SMC68CAQ      | 64.60                          | 71.40   | 1                | 1   | 58.1                                       | 16.3   | 92.0  |
| 1.5SMC75AQ        | 1.5SMC75CAQ      | 71.25                          | 78.75   | 1                | 1   | 64.1                                       | 14.6   | 103   |
| 1.5SMC82AQ        | 1.5SMC82CAQ      | 77.90                          | 86.10   | 1                | 1   | 70.1                                       | 13.3   | 113   |
| 1.5SMC91AQ        | 1.5SMC91CAQ      | 86.45                          | 95.35   | 1                | 1   | 77.8                                       | 12.0   | 125   |
| 1.5SMC100AQ       | 1.5SMC100CAQ     | 95.00                          | 105.00  | 1                | 1   | 85.5                                       | 11.0   | 137   |
| 1.5SMC110AQ       | 1.5SMC110CAQ     | 104.50                         | 115.50  | 1                | 1   | 94   | 9.9  | 152   |
| 1.5SMC120AQ       | 1.5SMC120CAQ     | 114.00                         | 126.00  | 1                | 1   | 102  | 9.1  | 165   |
| 1.5SMC130AQ       | 1.5SMC130CAQ     | 123.50                         | 136.50  | 1                | 1   | 111  | 8.4  | 179   |
| 1.5SMC150AQ       | 1.5SMC150CAQ     | 142.50                         | 157.50  | 1                | 1   | 128  | 7.3  | 207   |
| 1.5SMC160AQ       | 1.5SMC160CAQ     | 152.00                         | 168.00  | 1                | 5   | 136  | 6.9  | 219   |
| 1.5SMC170AQ       | 1.5SMC170CAQ     | 161.50                         | 178.50  | 1                | 5   | 145  | 6.4  | 234   |
| 1.5SMC180AQ       | 1.5SMC180CAQ     | 171.00                         | 189.00  | 1                | 5   | 154  | 6.1  | 246   |
| 1.5SMC200AQ       | 1.5SMC200CAQ     | 190.00                         | 210.00  | 1                | 5   | 171  | 5.5  | 274   |
| 1.5SMC220AQ       | 1.5SMC220CAQ     | 209.00                         | 231.00  | 1                | 5   | 185  | 4.6  | 328   |



# 1.5SMC6.8AQ THRU 1.5SMC220CAQ

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

| PARAMETER                   | SYMBOL                 | UNIT | Conditions          | VALUE |
|-----------------------------|------------------------|------|---------------------|-------|
| Thermal Resistance(Typical) | $R_{\theta J-A}^{(7)}$ | °C/W | junction to ambient | 75    |
|                             | $R_{\theta J-L}$       | °C/W | junction to lead    | 15    |

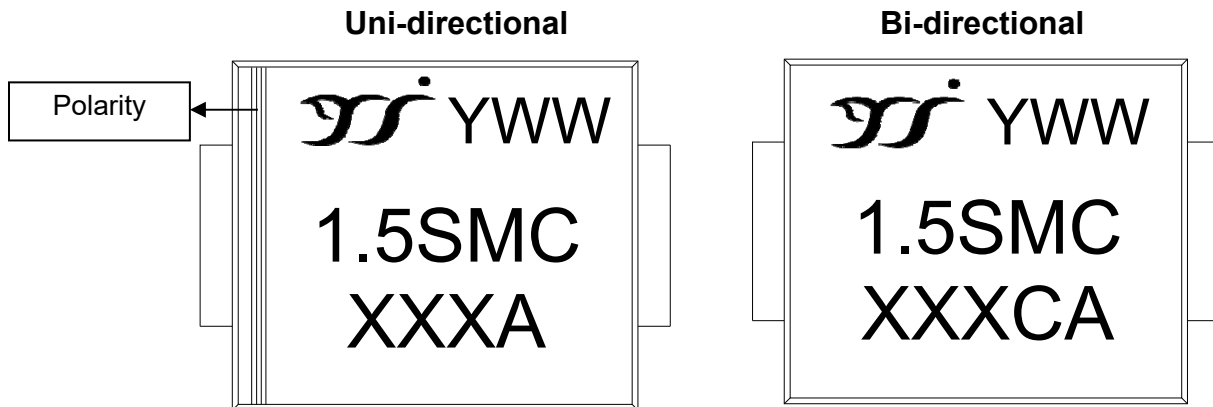
Notes:

- (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  $V_{BR}\leq 48\text{V}$ .
- (5) Pulse Test:  $t_p\leq 50\text{ms}$ .
- (6) Surge current waveform per Fig.3 and derated per Fig.2.
- (7) 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 |
|---------------|--------------|-------------------|----------------------|----------------------------|---------------|
| 1.5SMC SERIES | F1           | Approximate 0.251 | 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



# 1.5SMC6.8AQ THRU 1.5SMC220CAQ

## ■ Characteristics (Typical)

Fig.1 Peak Pulse Power Rating Curve

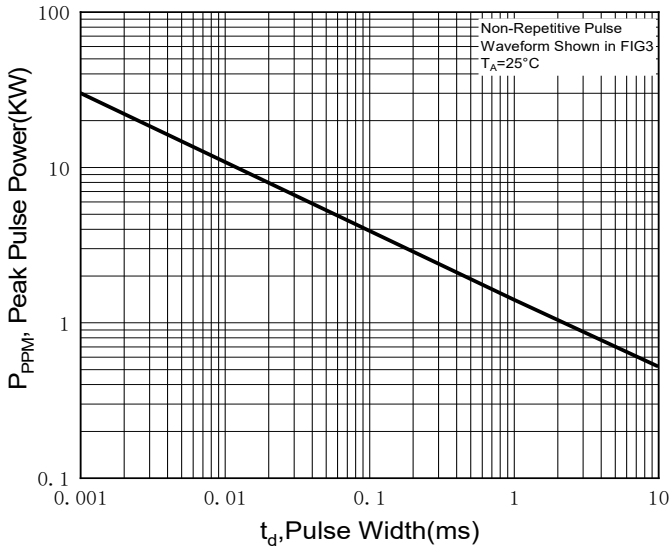


Fig.2 Pulse Power or Current vs. Initial Junction Temperature

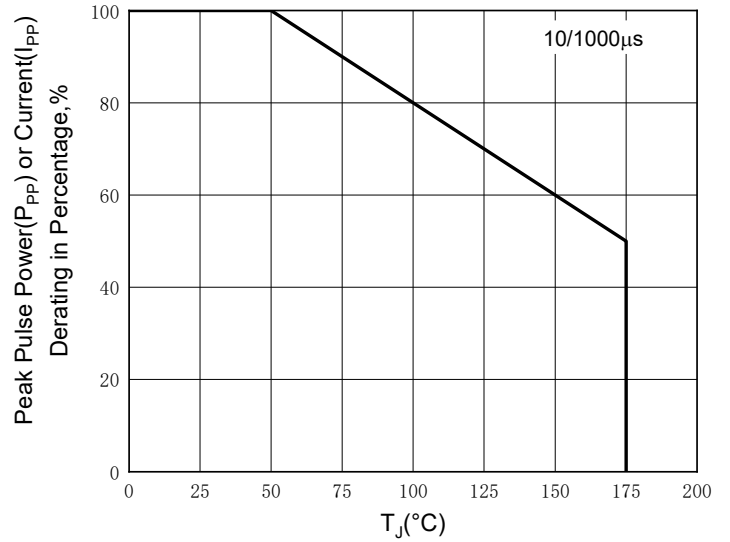


Fig.3 Pulse Waveform

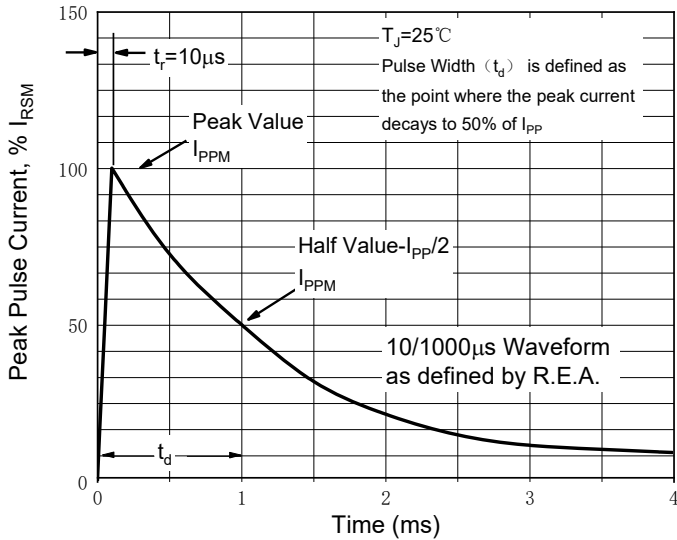


Fig.4 Typical Transient Thermal Impedance

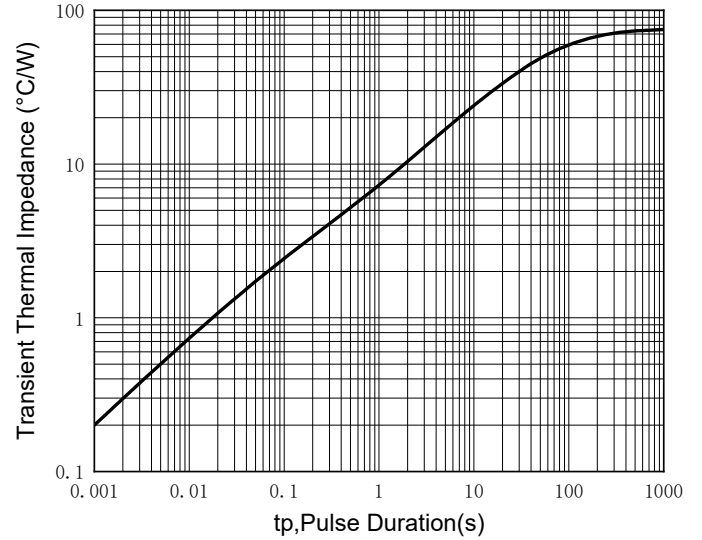


Fig.5 Maximum Non-Repetitive Forward Surge Current

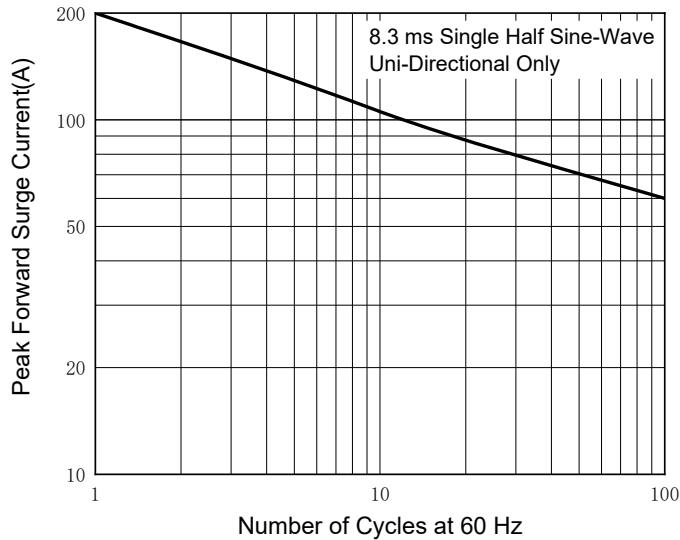
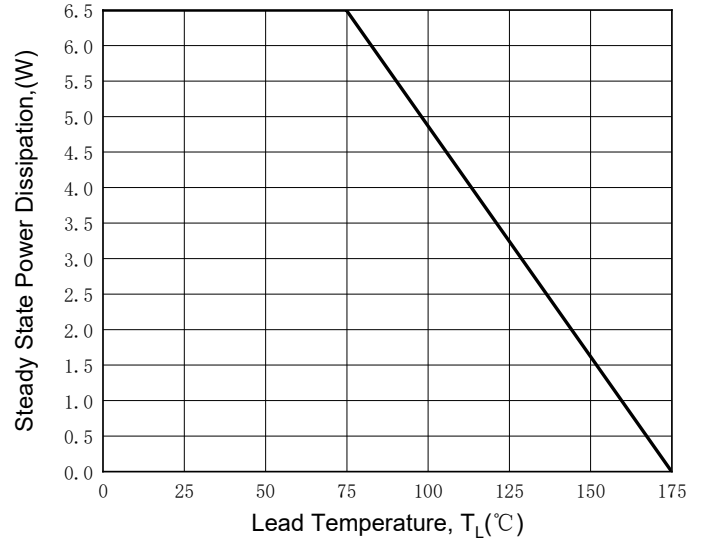


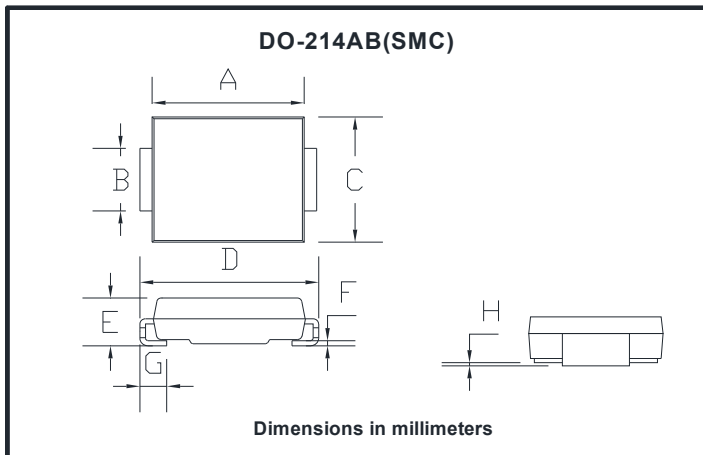
Fig.6 Steady State Power Derating Curve





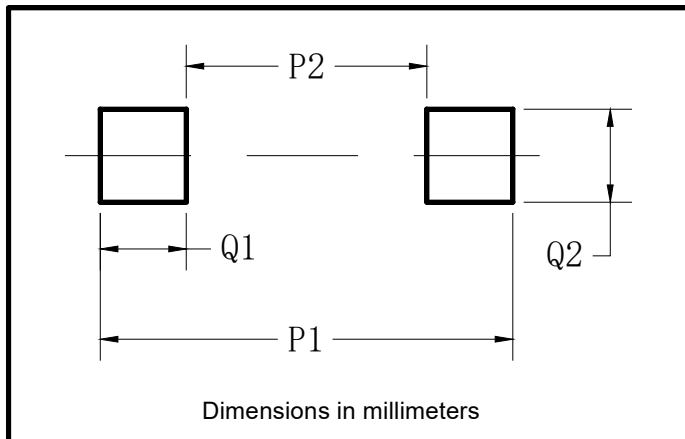
# 1.5SMC6.8AQ THRU 1.5SMC220CAQ

## ■ 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 |

## ■ Suggested pad layout



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



## 1.5SMC6.8AQ THRU 1.5SMC220CAQ

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