

## Transient Voltage Suppressors (TVS) Data Sheet

### Description

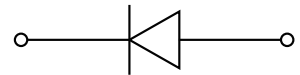
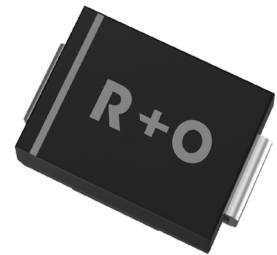
The 1.5SMC series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events

### Features

- For surface mounted applications in order to optimize board space
- Low leakage
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- 5000W peak pulse power capability at 10/1000μs waveform
- Fast response time
- Typical IR less than 5μA above 22V
- High Temperature soldering: 260°C /10 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
- Meets MSL level 1, per J-STD-020
- Halogen free and RoHS compliant
- 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**  
5.8 V to 512 V  
**Peak Pulse Power**  
1500 W

DO-214AB(SMC)



### Applications

TVS devices are ideal for the protection of I/O interfaces, AC/DC power supply, Low frequency signal transmission line (RS232, RS485, etc.)

### 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) | $P_{PPM}$        | 1500           | W      |
| Peak Pulse Current with a 10/1000μs waveform.(Note1,Fig.3)                       | $I_{PP}$         | See Next Table | A      |
| Power Dissipation on Infinite Heat Sink at Ta=75° C(Fig.5)                       | $P_{M(AV)}$      | 6.5            | W      |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3, Fig.5)          | $I_{FSM}$        | 100            | A      |
| Operating junction and Storage Temperature Range                                 | $T_J, T_{STG}$   | -55 to +150    | °C     |
| Typical thermal resistance junction to lead                                      | $R_{\theta J-L}$ | 15             | °C /W  |
| Typical thermal resistance junction to ambient                                   | $R_{\theta J-A}$ | 75             | °C /W  |

Note :

- (1) Non-repetitive current pulse, per Fig. 3 and derated above Ta = 25°C per Fig. 2.
- (2) Mounted on 8.0mm x 8.0mm Copper Pads to each terminal.
- (3) 8.3ms single half sine-wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum.

# 1.5SMC SERIES

1500W SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSORS

## ● Package Outline Dimensions (SMC/DO-214AB)

| Symbol | Dimensions  |      |        |       |
|--------|-------------|------|--------|-------|
|        | Millimeters |      | Inches |       |
|        | Min.        | Max. | Min.   | Max.  |
| A      | 2.85        | 3.27 | 0.112  | 0.129 |
| B      | 6.60        | 7.11 | 0.261  | 0.281 |
| C      | 5.59        | 6.22 | 0.221  | 0.246 |
| D      | 1.99        | 2.61 | 0.078  | 0.103 |
| E      | 0.76        | 1.52 | 0.030  | 0.060 |
| F      | -           | 0.20 | -      | 0.008 |
| G      | 7.75        | 8.13 | 0.306  | 0.321 |
| H      | 0.15        | 0.31 | 0.006  | 0.012 |

## ● Suggested Pad Layout

| Symbol | Dimensions  |      |        |       |
|--------|-------------|------|--------|-------|
|        | Millimeters |      | Inches |       |
|        | Min.        | Max. | Min.   | Max.  |
| M      | 3.82        | -    | 0.151  | -     |
| J      | 3.03        | -    | 0.120  | -     |
| K      | -           | 3.84 | -      | 0.152 |

## ● 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)            |
| 1.5SMC6.8A  | 1.5SMC6.8CA | 6V8A    | 6V8C | 5.8                       | 6.45                                   | 7.14 | 10           | 10.5                                | 144.8              | 1000                        |
| 1.5SMC7.5A  | 1.5SMC7.5CA | 7V5A    | 7V5C | 6.4                       | 7.13                                   | 7.88 | 10           | 11.3                                | 134.5              | 500                         |
| 1.5SMC8.2A  | 1.5SMC8.2CA | 8V2A    | 8V2C | 7.02                      | 7.79                                   | 8.61 | 10           | 12.1                                | 125.6              | 200                         |
| 1.5SMC9.1A  | 1.5SMC9.1CA | 9V1A    | 9V1C | 7.78                      | 8.65                                   | 9.5  | 1            | 13.4                                | 113.4              | 50                          |
| 1.5SMC10A   | 1.5SMC10CA  | 10A     | 10A  | 8.55                      | 9.5                                    | 10.5 | 1            | 14.5                                | 104.8              | 10                          |
| 1.5SMC11A   | 1.5SMC11CA  | 11A     | 11C  | 9.4                       | 10.5                                   | 11.6 | 1            | 15.6                                | 97.4               | 5                           |
| 1.5SMC12A   | 1.5SMC12CA  | 12A     | 12C  | 10.2                      | 11.4                                   | 12.6 | 1            | 16.7                                | 91.0               | 5                           |
| 1.5SMC13A   | 1.5SMC13CA  | 13A     | 13C  | 11.1                      | 12.4                                   | 13.7 | 1            | 18.2                                | 83.5               | 1                           |
| 1.5SMC15A   | 1.5SMC15CA  | 15A     | 15C  | 12.8                      | 14.3                                   | 15.8 | 1            | 21.2                                | 71.7               | 1                           |
| 1.5SMC16A   | 1.5SMC16CA  | 16A     | 16C  | 13.6                      | 15.2                                   | 16.8 | 1            | 22.5                                | 67.6               | 1                           |
| 1.5SMC18A   | 1.5SMC18CA  | 18A     | 18C  | 15.3                      | 17.1                                   | 18.9 | 1            | 25.2                                | 60.3               | 1                           |
| 1.5SMC20A   | 1.5SMC20CA  | 20A     | 20C  | 17.1                      | 19                                     | 21   | 1            | 27.7                                | 54.9               | 1                           |
| 1.5SMC22A   | 1.5SMC22CA  | 22A     | 22C  | 18.8                      | 20.9                                   | 23.1 | 1            | 30.6                                | 49.7               | 1                           |
| 1.5SMC24A   | 1.5SMC24CA  | 24A     | 24C  | 20.5                      | 22.8                                   | 25.2 | 1            | 33.2                                | 45.8               | 1                           |
| 1.5SMC27A   | 1.5SMC27CA  | 27A     | 27C  | 23.1                      | 25.7                                   | 28.4 | 1            | 37.5                                | 40.5               | 1                           |
| 1.5SMC30A   | 1.5SMC30CA  | 30A     | 30C  | 25.6                      | 28.5                                   | 31.5 | 1            | 41.4                                | 36.7               | 1                           |

# 1.5SMC SERIES

1500W SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSORS

## ● 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)            |
| 1.5SMC33A   | 1.5SMC33CA  | 33A     | 33C  | 28.2                      | 31.4                                   | 34.7  | 1            | 45.7                               | 33.3               | 1                           |
| 1.5SMC36A   | 1.5SMC36CA  | 36A     | 36C  | 30.8                      | 34.2                                   | 37.8  | 1            | 49.9                               | 30.5               | 1                           |
| 1.5SMC39A   | 1.5SMC39CA  | 39A     | 39C  | 33.3                      | 37.1                                   | 41    | 1            | 53.9                               | 28.2               | 1                           |
| 1.5SMC43A   | 1.5SMC43CA  | 43A     | 43C  | 36.8                      | 40.9                                   | 45.2  | 1            | 59.3                               | 25.6               | 1                           |
| 1.5SMC47A   | 1.5SMC47CA  | 47A     | 47C  | 40.2                      | 44.7                                   | 49.4  | 1            | 64.8                               | 23.5               | 1                           |
| 1.5SMC51A   | 1.5SMC51CA  | 51A     | 51C  | 43.6                      | 48.5                                   | 53.6  | 1            | 70.1                               | 21.7               | 1                           |
| 1.5SMC56A   | 1.5SMC56CA  | 56A     | 56C  | 47.8                      | 53.2                                   | 58.8  | 1            | 77                                 | 19.7               | 1                           |
| 1.5SMC62A   | 1.5SMC62CA  | 62A     | 62C  | 53                        | 58.9                                   | 65.1  | 1            | 85                                 | 17.9               | 1                           |
| 1.5SMC68A   | 1.5SMC68CA  | 68A     | 68C  | 58.1                      | 64.6                                   | 71.4  | 1            | 92                                 | 16.5               | 1                           |
| 1.5SMC75A   | 1.5SMC75CA  | 75A     | 75C  | 64.1                      | 71.3                                   | 78.8  | 1            | 103                                | 14.8               | 1                           |
| 1.5SMC82A   | 1.5SMC82CA  | 82A     | 82C  | 70.1                      | 77.9                                   | 86.1  | 1            | 113                                | 13.5               | 1                           |
| 1.5SMC91A   | 1.5SMC91CA  | 91A     | 91C  | 77.8                      | 86.5                                   | 95.50 | 1            | 125                                | 12.2               | 1                           |
| 1.5SMC100A  | 1.5SMC100CA | 100A    | 100C | 85.5                      | 95                                     | 105   | 1            | 137                                | 11.1               | 1                           |
| 1.5SMC110A  | 1.5SMC110CA | 110A    | 110C | 94                        | 105                                    | 116   | 1            | 152                                | 10                 | 1                           |
| 1.5SMC120A  | 1.5SMC120CA | 120A    | 120C | 102                       | 114                                    | 126   | 1            | 165                                | 9.2                | 1                           |
| 1.5SMC130A  | 1.5SMC130CA | 130A    | 130C | 111                       | 124                                    | 137   | 1            | 179                                | 8.5                | 1                           |
| 1.5SMC150A  | 1.5SMC150CA | 150A    | 150C | 128                       | 143                                    | 158   | 1            | 207                                | 7.3                | 1                           |
| 1.5SMC160A  | 1.5SMC160CA | 160A    | 160C | 136                       | 152                                    | 168   | 1            | 219                                | 6.9                | 1                           |
| 1.5SMC170A  | 1.5SMC170CA | 170A    | 170C | 145                       | 162                                    | 179   | 1            | 234                                | 6.5                | 1                           |
| 1.5SMC180A  | 1.5SMC180CA | 180A    | 180C | 154                       | 171                                    | 189   | 1            | 246                                | 6.2                | 1                           |
| 1.5SMC200A  | 1.5SMC200CA | 200A    | 200C | 171                       | 190                                    | 210   | 1            | 274                                | 5.5                | 1                           |
| 1.5SMC220A  | 1.5SMC220CA | 220A    | 220C | 185                       | 209                                    | 231   | 1            | 328                                | 4.6                | 1                           |
| 1.5SMC250A  | 1.5SMC250CA | 250A    | 250C | 214                       | 237                                    | 263   | 1            | 344                                | 4.4                | 1                           |
| 1.5SMC300A  | 1.5SMC300CA | 300A    | 300C | 256                       | 285                                    | 315   | 1            | 414                                | 3.7                | 1                           |
| 1.5SMC350A  | 1.5SMC350CA | 350A    | 350C | 300                       | 332                                    | 368   | 1            | 482                                | 3.2                | 1                           |
| 1.5SMC400A  | 1.5SMC400CA | 400A    | 400C | 342                       | 380                                    | 420   | 1            | 548                                | 2.8                | 1                           |
| 1.5SMC440A  | 1.5SMC440CA | 440A    | 440C | 376                       | 418                                    | 462   | 1            | 602                                | 2.5                | 1                           |
| 1.5SMC480A  | 1.5SMC480CA | 480A    | 480C | 408                       | 456                                    | 504   | 1            | 658                                | 2.3                | 1                           |
| 1.5SMC510A  | 1.5SMC510CA | 510A    | 510C | 434                       | 485                                    | 535   | 1            | 698                                | 2.1                | 1                           |
| 1.5SMC530A  | 1.5SMC530CA | 530A    | 530C | 451                       | 503.5                                  | 556.5 | 1            | 725                                | 2.1                | 1                           |
| 1.5SMC540A  | 1.5SMC540CA | 540A    | 540C | 460                       | 513                                    | 567   | 1            | 740                                | 2.0                | 1                           |
| 1.5SMC550A  | 1.5SMC550CA | 550A    | 550C | 468                       | 522.5                                  | 577.5 | 1            | 760                                | 2.0                | 1                           |
| 1.5SMC600A  | 1.5SMC600CA | 600A    | 600C | 512                       | 570                                    | 630   | 1            | 828                                | 1.9                | 1                           |

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 18 volts and less, the IR limit is double.

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

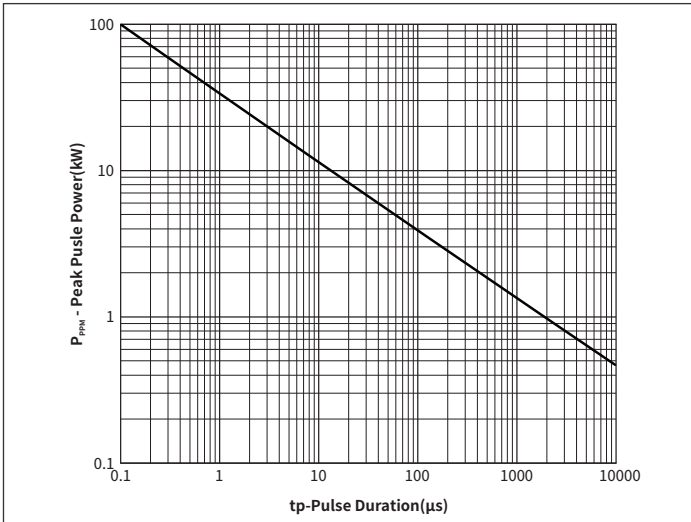


Fig. 1 Peak Pulse Power Rating Curve

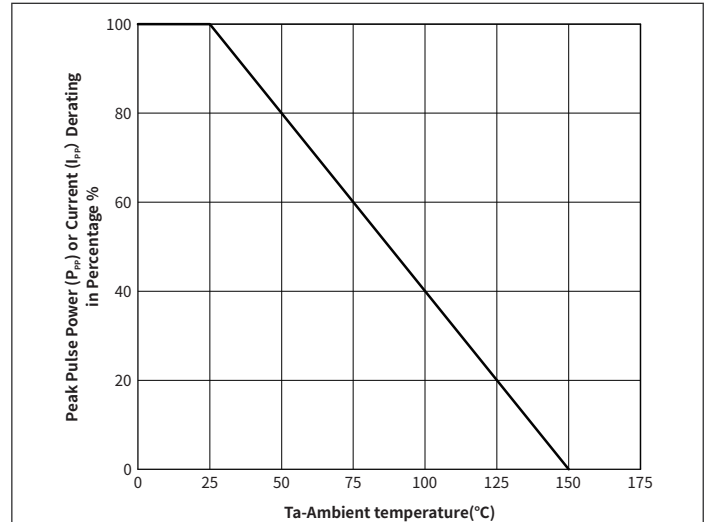


Fig. 2 Pulse Derating Curve

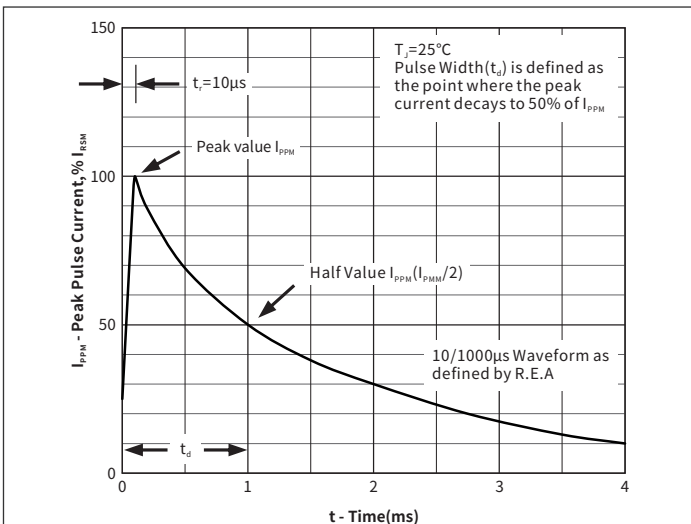


Fig. 3 Pulse Waveform

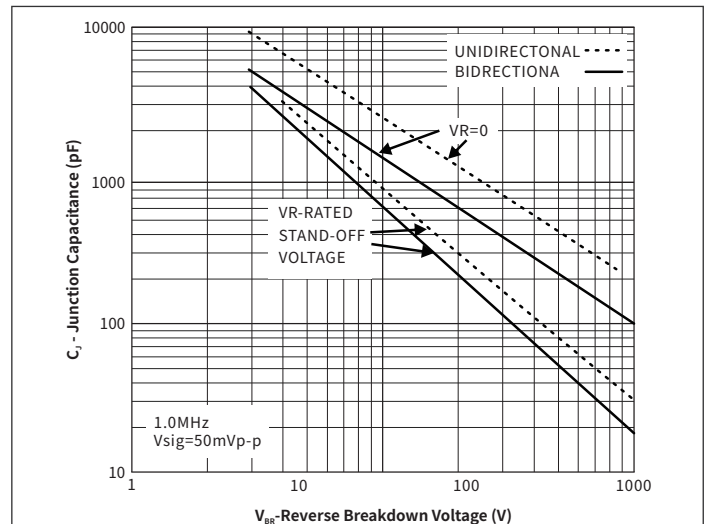


Fig. 4 Typical Junction Capacitance

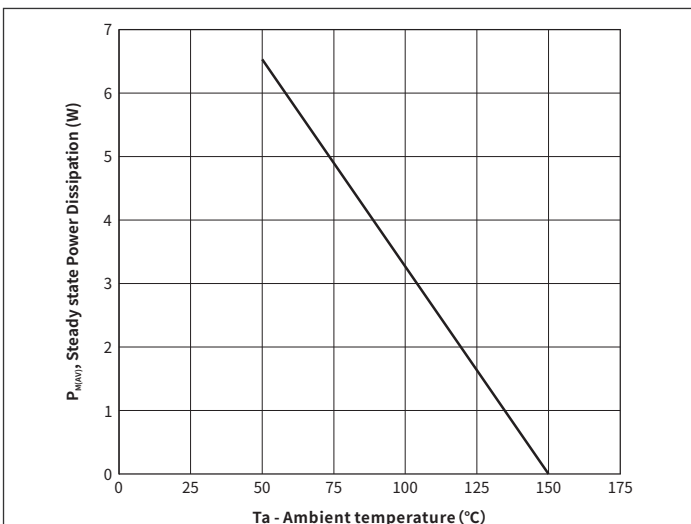


Fig. 5 Steady State Power Dissipation Derating Curve

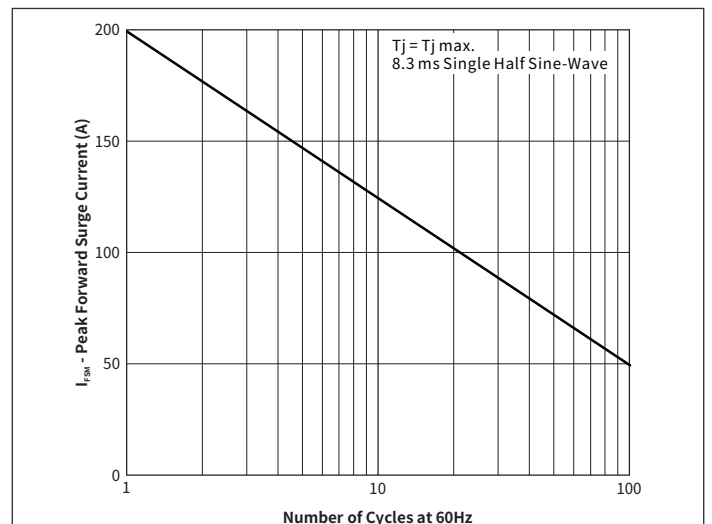


Fig. 6 Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

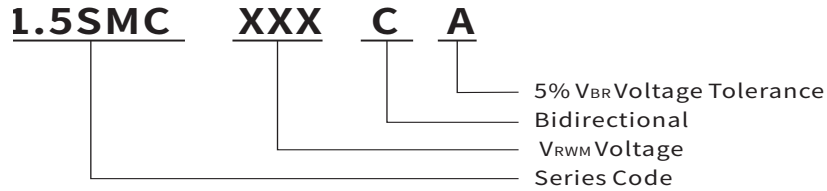
# 1.5SMC SERIES

1500W SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSORS

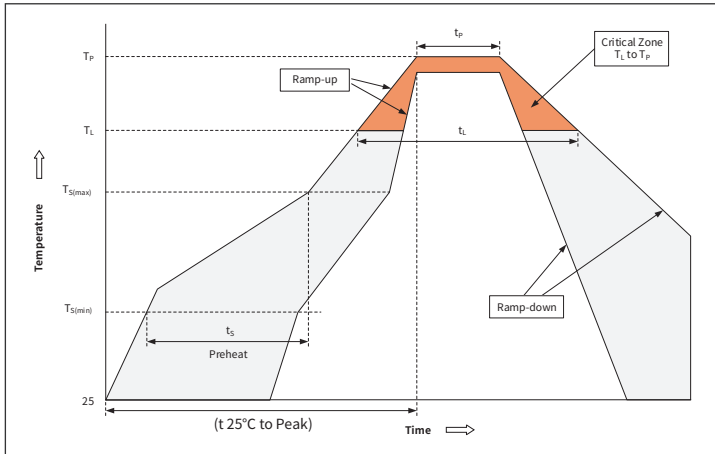
## ● Ordering Information

| PACKAGE | PACKAGE CODE | UNIT WEIGHT(g) | REEL(pcs) | BOX(pcs) | CARTON(pcs) | DELIVERY MODE |
|---------|--------------|----------------|-----------|----------|-------------|---------------|
| SMC     | R3           | 0.257          | 3000      | 6000     | 48000       | 13"           |

## ● Part Numbering



## ● Soldering Parameters



| Profile Feature   |                                   | Pb-Free Assembly |
|---|-----------------------------------|------------------|
| Pre-heat  | Temperature Min ( $T_{s(min)}$ )  | +150°C           |
|   | Temperature Max ( $T_{s(max)}$ )  | +200°C           |
|   | Time (Min to Max) ( $t_s$ )       | 60-180 secs.     |
| Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak) |                                   | 3°C /sec. Max    |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                    |                                   | 3°C /sec. Max    |
| Reflow  | Temperature ( $T_L$ ) (Liquid us) | +217°C           |
|   | Temperature ( $t_L$ )             | 60-150 secs.     |
| Peak Temp ( $T_p$ )                                     |                                   | +260(+0/-5)°C    |
| Time within 5°C of actual Peak Temp ( $t_p$ )           |                                   | 30 secs. Max     |
| Ramp-down Rate  |                                   | 6°C /sec. Max    |
| Time 25°C to Peak Temp ( $T_p$ )                        |                                   | 8 min. Max       |
| Do not exceed   |                                   | +260°C           |

## ● Packaging (SMC/DO-214AB)

