

## Transient Voltage Suppressors (TVS) Data Sheet

## ● Description

The SMDJ 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
- 3000W 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)

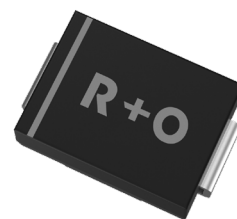
**Breakdown Voltage**

5.0 to 440 V

**Peak Pulse Power**

3000 W

DO-214AB(SMC)



Bi-directional



Uni-directional



## ● 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) | $P_{PPM}$        | 3000           | 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)          | $I_{FSM}$        | 300            | 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.

## ● 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)       | $I_R$ (μA)                  |
| SMDJ5.0A    | SMDJ5.0CA | RDE     | DDE | 5                         | 6.4                                    | 7    | 10           | 9.2                                 | 326.1              | 800                         |
| SMDJ6.0A    | SMDJ6.0CA | RDG     | DDG | 6                         | 6.67                                   | 7.37 | 10           | 10.3                                | 291.3              | 800                         |
| SMDJ6.5A    | SMDJ6.5CA | RDK     | DDK | 6.5                       | 7.22                                   | 7.98 | 10           | 11.2                                | 267.9              | 500                         |
| SMDJ7.0A    | SMDJ7.0CA | PDM     | DDM | 7                         | 7.78                                   | 8.6  | 10           | 12.0                                | 250.0              | 200                         |
| SMDJ7.5A    | SMDJ7.5CA | PDP     | DDP | 7.5                       | 8.33                                   | 9.21 | 1            | 12.9                                | 232.6              | 100                         |
| SMDJ8.0A    | SMDJ8.0CA | PDR     | DDR | 8                         | 8.89                                   | 9.83 | 1            | 13.6                                | 220.6              | 50                          |
| SMDJ8.5A    | SMDJ8.5CA | PDT     | DDT | 8.5                       | 9.44                                   | 10.4 | 1            | 14.4                                | 208.3              | 20                          |
| SMDJ9.0A    | SMDJ9.0CA | PDV     | DDV | 9                         | 10                                     | 11.1 | 1            | 15.4                                | 194.8              | 10                          |
| SMDJ10A     | SMDJ10CA  | PDX     | DDX | 10                        | 11.1                                   | 12.3 | 1            | 17.0                                | 176.5              | 5                           |
| SMDJ11A     | SMDJ11CA  | PDZ     | DDZ | 11                        | 12.2                                   | 13.5 | 1            | 18.2                                | 164.8              | 2                           |
| SMDJ12A     | SMDJ12CA  | PEE     | DEE | 12                        | 13.3                                   | 14.7 | 1            | 19.9                                | 150.8              | 2                           |
| SMDJ13A     | SMDJ13CA  | PEG     | DEG | 13                        | 14.4                                   | 15.9 | 1            | 21.5                                | 139.5              | 2                           |
| SMDJ14A     | SMDJ14CA  | PEK     | DEK | 14                        | 15.6                                   | 17.2 | 1            | 23.2                                | 129.3              | 2                           |
| SMDJ15A     | SMDJ15CA  | PEM     | DEM | 15                        | 16.7                                   | 18.5 | 1            | 24.4                                | 123.0              | 2                           |
| SMDJ16A     | SMDJ16CA  | PEP     | DEP | 16                        | 17.8                                   | 19.7 | 1            | 26.0                                | 115.4              | 2                           |
| SMDJ17A     | SMDJ17CA  | PER     | DER | 17                        | 18.9                                   | 20.9 | 1            | 27.6                                | 108.7              | 2                           |
| SMDJ18A     | SMDJ18CA  | PET     | DET | 18                        | 20                                     | 22.1 | 1            | 29.2                                | 102.7              | 2                           |
| SMDJ20A     | SMDJ20CA  | PEV     | DEV | 20                        | 22.2                                   | 24.5 | 1            | 32.4                                | 92.6               | 2                           |

● **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)            |
| SMDJ22A     | SMDJ22CA  | PEX     | DEX | 22                        | 24.4                                   | 26.9 | 1            | 35.5                               | 84.5               | 2                           |
| SMDJ24A     | SMDJ24CA  | PEZ     | DEZ | 24                        | 26.7                                   | 29.5 | 1            | 38.9                               | 77.1               | 2                           |
| SMDJ26A     | SMDJ26CA  | PFE     | DFE | 26                        | 28.9                                   | 31.9 | 1            | 42.1                               | 71.3               | 2                           |
| SMDJ28A     | SMDJ28CA  | PFG     | DFG | 28                        | 31.1                                   | 34.4 | 1            | 45.4                               | 66.1               | 2                           |
| SMDJ30A     | SMDJ30CA  | PFK     | DFK | 30                        | 33.3                                   | 36.8 | 1            | 48.4                               | 62.0               | 2                           |
| SMDJ33A     | SMDJ33CA  | PFM     | DFM | 33                        | 36.7                                   | 40.6 | 1            | 53.3                               | 56.3               | 2                           |
| SMDJ36A     | SMDJ36CA  | PFP     | DFP | 36                        | 40                                     | 44.2 | 1            | 58.1                               | 51.6               | 2                           |
| SMDJ40A     | SMDJ40CA  | PFR     | PFR | 40                        | 44.4                                   | 49.1 | 1            | 64.5                               | 46.5               | 2                           |
| SMDJ43A     | SMDJ43CA  | PFT     | DFT | 43                        | 47.8                                   | 52.8 | 1            | 69.4                               | 43.2               | 2                           |
| SMDJ45A     | SMDJ45CA  | PFV     | DFV | 45                        | 50                                     | 55.3 | 1            | 72.7                               | 41.3               | 2                           |
| SMDJ48A     | SMDJ48CA  | PFX     | DFX | 48                        | 53.3                                   | 58.9 | 1            | 77.4                               | 38.8               | 2                           |
| SMDJ51A     | SMDJ51CA  | PFZ     | DFZ | 51                        | 56.7                                   | 62.7 | 1            | 82.4                               | 36.4               | 2                           |
| SMDJ54A     | SMDJ54CA  | RGE     | DGE | 54                        | 60                                     | 66.3 | 1            | 87.1                               | 34.4               | 2                           |
| SMDJ58A     | SMDJ58CA  | PGG     | DGG | 58                        | 64.4                                   | 71.2 | 1            | 93.6                               | 32.1               | 2                           |
| SMDJ60A     | SMDJ60CA  | PGK     | DGK | 60                        | 66.7                                   | 73.7 | 1            | 96.8                               | 31.0               | 2                           |
| SMDJ64A     | SMDJ64CA  | PGM     | DGM | 64                        | 71.1                                   | 78.6 | 1            | 103                                | 29.1               | 2                           |
| SMDJ70A     | SMDJ70CA  | PGP     | DGP | 70                        | 77.8                                   | 86   | 1            | 113                                | 26.5               | 2                           |
| SMDJ75A     | SMDJ75CA  | PGR     | DGR | 75                        | 83.3                                   | 92.1 | 1            | 121                                | 24.8               | 2                           |
| SMDJ78A     | SMDJ78CA  | PGT     | DGT | 78                        | 86.7                                   | 95.8 | 1            | 126                                | 23.8               | 2                           |
| SMDJ85A     | SMDJ85CA  | PGV     | DGV | 85                        | 94.4                                   | 104  | 1            | 137                                | 21.9               | 2                           |
| SMDJ90A     | SMDJ90CA  | PGX     | DGX | 90                        | 100                                    | 111  | 1            | 146                                | 20.5               | 2                           |
| SMDJ100A    | SMDJ100CA | PGZ     | DGZ | 100                       | 111                                    | 123  | 1            | 162                                | 18.5               | 2                           |
| SMDJ110A    | SMDJ110CA | PHE     | DHE | 110                       | 122                                    | 135  | 1            | 177                                | 16.9               | 2                           |
| SMDJ120A    | SMDJ120CA | PHG     | DHG | 120                       | 133                                    | 147  | 1            | 193                                | 15.5               | 2                           |
| SMDJ130A    | SMDJ130CA | PHK     | DHK | 130                       | 144                                    | 159  | 1            | 209                                | 14.4               | 2                           |
| SMDJ150A    | SMDJ150CA | PHM     | DHM | 150                       | 167                                    | 185  | 1            | 243                                | 12.3               | 2                           |
| SMDJ160A    | SMDJ160CA | PHP     | DHP | 160                       | 178                                    | 197  | 1            | 259                                | 11.6               | 2                           |
| SMDJ170A    | SMDJ170CA | PHR     | DHR | 170                       | 189                                    | 209  | 1            | 275                                | 10.9               | 2                           |
| SMDJ180A    | SMDJ180CA | PHT     | DHT | 180                       | 200                                    | 221  | 1            | 292                                | 10.3               | 2                           |
| SMDJ200A    | SMDJ200CA | PHV     | DHV | 200                       | 224                                    | 247  | 1            | 324                                | 9.3                | 2                           |
| SMDJ220A    | SMDJ220CA | PKE     | DKE | 220                       | 244                                    | 270  | 1            | 356                                | 8.4                | 2                           |
| SMDJ250A    | SMDJ250CA | PKG     | DKG | 250                       | 279                                    | 309  | 1            | 405                                | 7.5                | 2                           |
| SMDJ300A    | SMDJ300CA | PKI     | DKI | 300                       | 335                                    | 371  | 1            | 486                                | 6.2                | 2                           |
| SMDJ350A    | SMDJ350CA | PKJ     | DKJ | 350                       | 391                                    | 432  | 1            | 567                                | 5.3                | 2                           |
| SMDJ400A    | SMDJ400CA | PKL     | DKL | 400                       | 447                                    | 494  | 1            | 648                                | 4.7                | 2                           |
| SMDJ440A    | SMDJ440CA | PKN     | DKN | 440                       | 492                                    | 543  | 1            | 713                                | 4.3                | 2                           |

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)

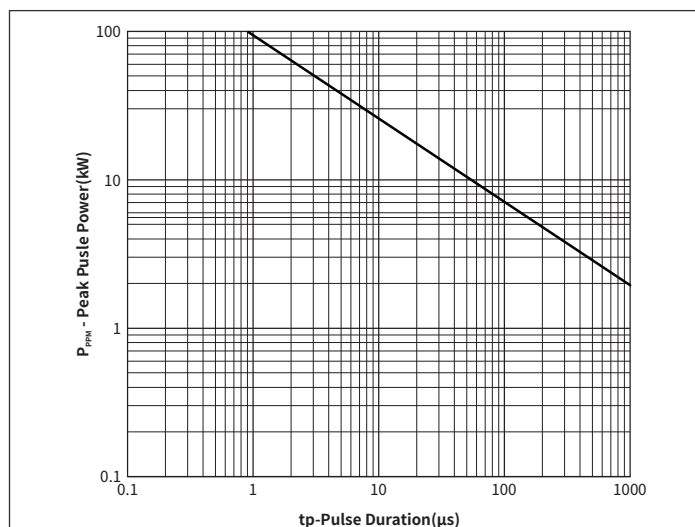


Fig. 1 Peak Pulse Power Rating Curve

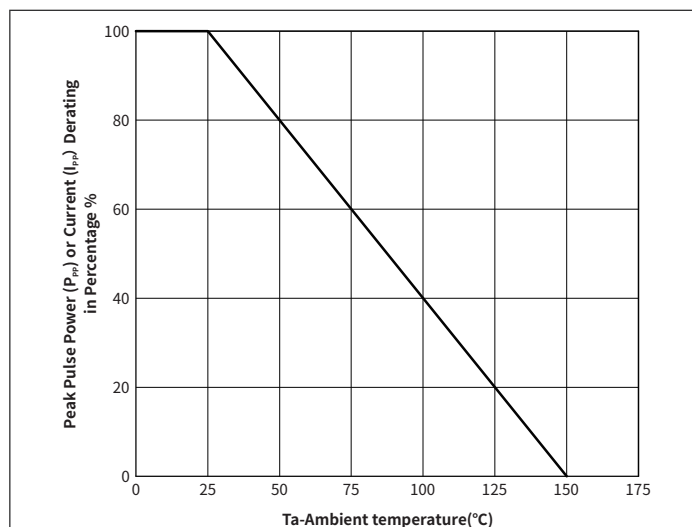


Fig.2 Pulse Derating Curve

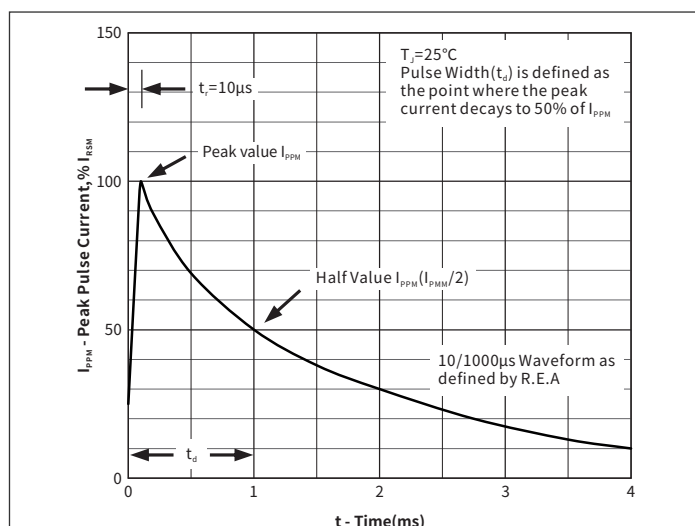


Fig.3 Pulse Waveform

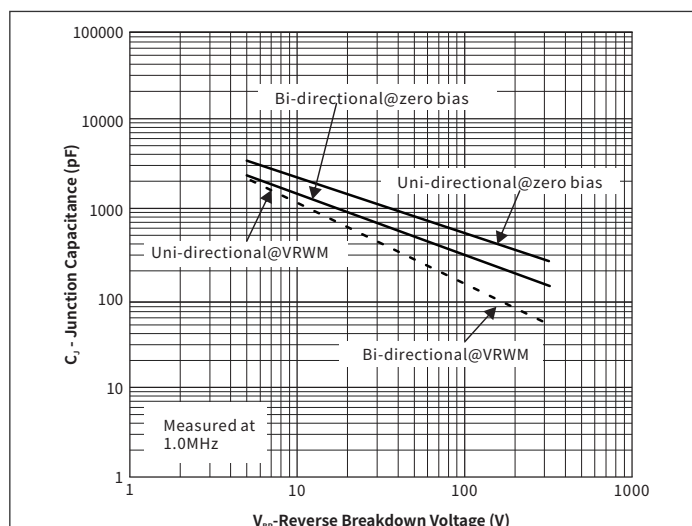


Fig.4 Typical Junction Capacitance

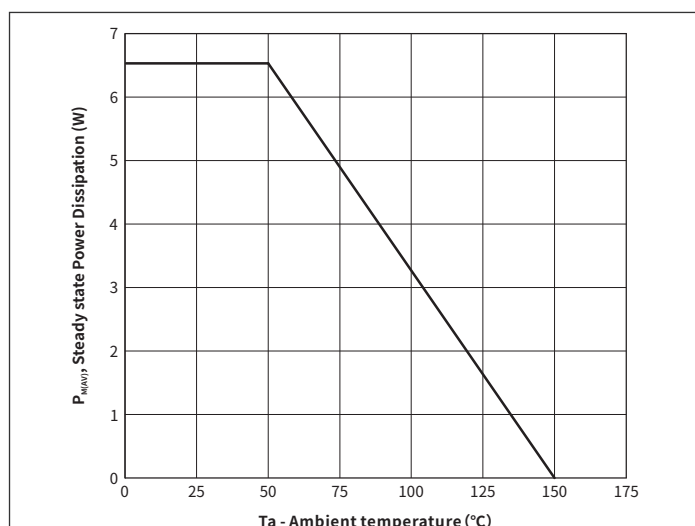


Fig.5 Steady State Power Dissipation Derating Curve

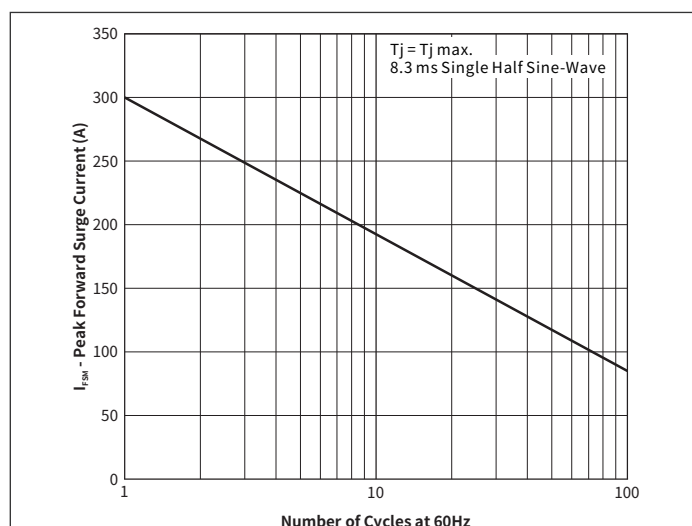
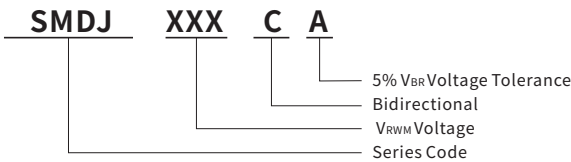


Fig.6 Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

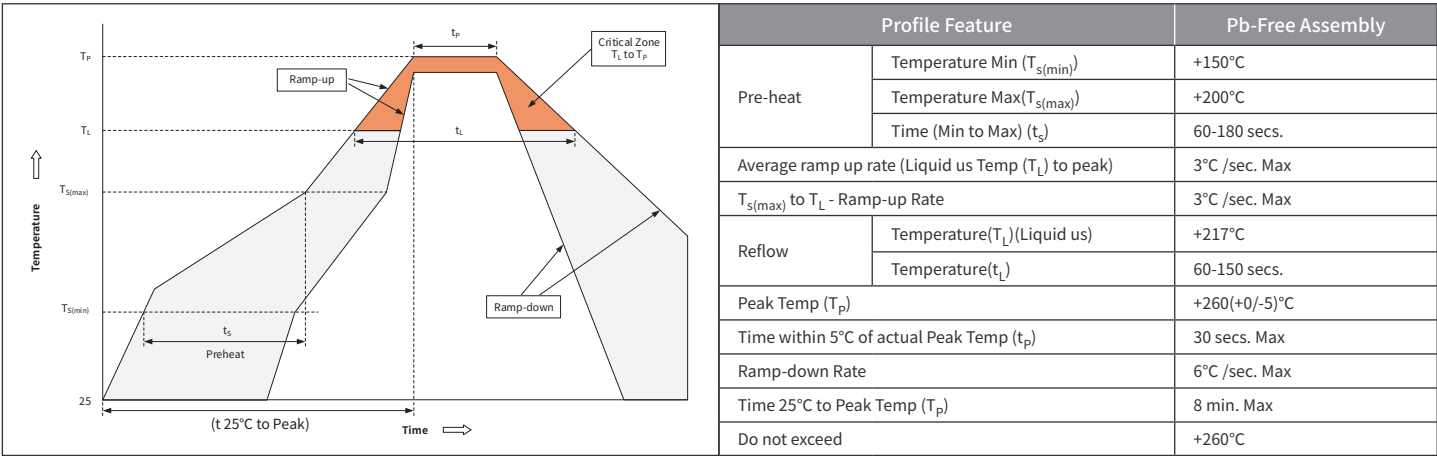
● Ordering Information

| 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



● Packaging (SMC/DO-214AB)

