

# Transient Voltage Suppression Diodes: SMCJ Series

## SMD Type 1500 W



### ■ Features

1. For surface mounted applications
2. RoHS compliant and halogen-free
3. Reliable low cost construction utilizing molded plastic technique
4. Glass passivated chip junction
5. Both bi-directional and uni-directional devices are available
6. Fast response time
7. Typical IR less than 1 $\mu$ A above 11V
8. Excellent clamping capacity
9. 1500W peak pulse power capability with a 10/1000  $\mu$ s waveform, repetition rate (duty cycle): 0.01%



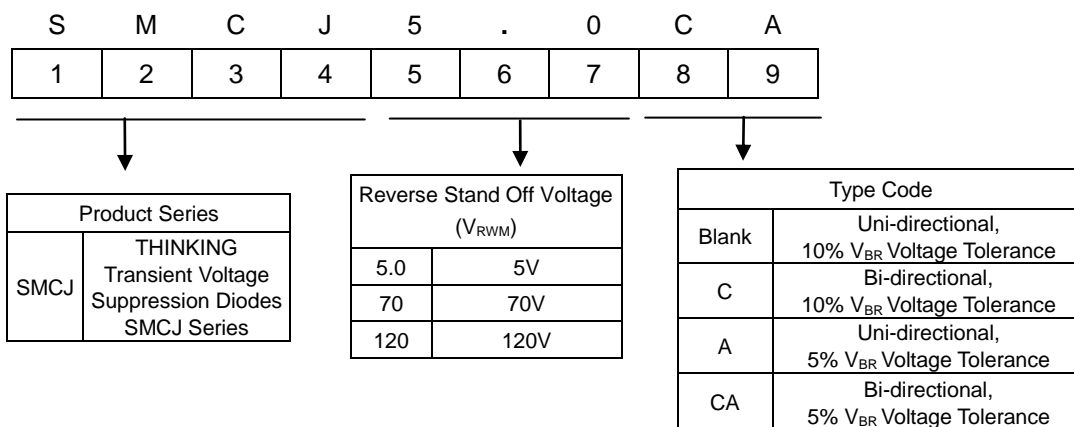
### ■ Recommended Applications

1. Telecommunication
2. Computer
3. Industrial device
4. Consumer electronic device

### ■ Mechanical Data

1. Case: DO-214AB (SMC), molded plastic meets UL flammability rating 94V-0
2. Terminal: Matte Tin-plated leads, solderable per MIL-STD-750, Method 2026
3. Polarity: The band denotes cathode (Note: no polarity indicator for bi-directional devices)

### ■ Part Number Code



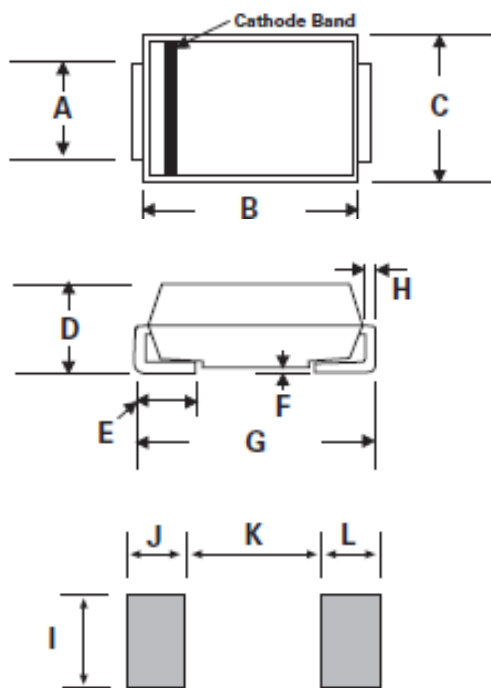
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### Structures and Dimensions

#### SMC/DO-214AB



| Item | Millimeters |       | Inches |       |
|------|-------------|-------|--------|-------|
|      | Min.        | Max.  | Min.   | Max.  |
| A    | 2.75        | 3.25  | 0.108  | 0.128 |
| B    | 6.60        | 7.11  | 0.260  | 0.280 |
| C    | 5.59        | 6.22  | 0.220  | 0.245 |
| D    | 2.00        | 2.70  | 0.079  | 0.103 |
| E    | 0.76        | 1.52  | 0.030  | 0.060 |
| F    | -           | 0.203 | -      | 0.008 |
| G    | 7.75        | 8.13  | 0.305  | 0.320 |
| H    | 0.152       | 0.305 | 0.006  | 0.012 |
| I    | 3.30        | -     | 0.129  | -     |
| J/L  | 2.40        | -     | 0.094  | -     |
| K    | -           | 4.20  | -      | 0.165 |

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

| Parameter  | Symbol         | Value     | Unit             |
|--|----------------|-----------|------------------|
| Peak pulse power dissipation at $T_A=25^\circ\text{C}$ by 10/1000 $\mu\text{s}$ waveform (Note1, Fig.1). | $P_{PPM}$      | 1500      | W                |
| Peak pulse current of on 10/1000us waveform (Note1, Fig.3)   | $I_{PPM}$      | See Table | A                |
| Peak forward surge current, 8.3ms single half sine wave on rated load (Note 2)                           | $I_{FSM}$      | 200       | A                |
| Steady state power dissipation $T_A=50^\circ\text{C}$ (Fig.5)  | $P_{M(AV)}$    | 6.5       | W                |
| Operating junction and storage temperature range   | $T_J, T_{STG}$ | -55~+150  | $^\circ\text{C}$ |

Note: 1. Please refer to Fig. 3 for non-repetitive current pulse, and Fig. 2 for derated above  $T_A = 25^\circ\text{C}$

2. 8.3ms single half sine-wave, or square wave that has a maximum of 4 pulses per minute.

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

| Part No.<br>(Uni) | Part No.<br>(Bi) | Reverse<br>Stand off<br>Voltage | Breakage<br>Voltage<br>$V_{BR}$ @ $I_T$ |        | Test<br>Current | Maximum<br>Clamping<br>Voltage<br>$V_C$ @ $I_{pp}$ | Maximum<br>Peak Pulse<br>Current | Maximum<br>Reverse<br>Leakage<br>$I_R$ @ $V_{RWM}$ | Marking<br>Code |            |
|-------------------|------------------|---------------------------------|---|--------|-----------------|--|----------------------------------|--|-----------------|------------|
|                   |                  |                                 | $V_{RWM}$ (V)                           | Min(V) |                 |  |                                  |  | Max(V)          | $I_T$ (mA) |
| SMCJ5.0A          | SMCJ5.0CA        | 5.0                             | 6.40                                    | 7.00   | 10              | 9.2  | 163.0                            | 800  | GDE             | BDE        |
| SMCJ6.0A          | SMCJ6.0CA        | 6.0                             | 6.67                                    | 7.37   | 10              | 10.3   | 145.7                            | 800  | GDG             | BDG        |
| SMCJ6.5A          | SMCJ6.5CA        | 6.5                             | 7.22                                    | 7.98   | 10              | 11.2   | 134.0                            | 500  | GDK             | BDK        |
| SMCJ7.0A          | SMCJ7.0CA        | 7.0                             | 7.78                                    | 8.60   | 10              | 12.0   | 125.0                            | 200  | GDM             | BDM        |
| SMCJ7.5A          | SMCJ7.5CA        | 7.5                             | 8.33                                    | 9.21   | 1               | 12.9   | 116.3                            | 100  | GDP             | BDP        |
| SMCJ8.0A          | SMCJ8.0CA        | 8.0                             | 8.89                                    | 9.83   | 1               | 13.6   | 110.3                            | 50   | GDR             | BDR        |
| SMCJ8.5A          | SMCJ8.5CA        | 8.5                             | 9.44                                    | 10.4   | 1               | 14.4   | 104.2                            | 20   | GDT             | BDT        |
| SMCJ9.0A          | SMCJ9.0CA        | 9.0                             | 10.0                                    | 11.1   | 1               | 15.4   | 97.4                             | 10   | GDV             | BDV        |
| SMCJ10A           | SMCJ10CA         | 10                              | 11.1                                    | 12.3   | 1               | 17.0   | 88.3                             | 5  | GDX             | BDX        |
| SMCJ11A           | SMCJ11CA         | 11                              | 12.2                                    | 13.5   | 1               | 18.2   | 82.5                             | 1  | GDZ             | BDZ        |
| SMCJ12A           | SMCJ12CA         | 12                              | 13.3                                    | 14.7   | 1               | 19.9   | 75.4                             | 1  | GEE             | BEE        |
| SMCJ13A           | SMCJ13CA         | 13                              | 14.4                                    | 15.9   | 1               | 21.5   | 69.8                             | 1  | GEG             | BEG        |
| SMCJ14A           | SMCJ14CA         | 14                              | 15.6                                    | 17.2   | 1               | 23.2   | 64.7                             | 1  | GEK             | BEK        |
| SMCJ15A           | SMCJ15CA         | 15                              | 16.7                                    | 18.5   | 1               | 24.4   | 61.5                             | 1  | GEM             | BEM        |
| SMCJ16A           | SMCJ16CA         | 16                              | 17.8                                    | 19.7   | 1               | 26.0   | 57.7                             | 1  | GEP             | BEP        |
| SMCJ17A           | SMCJ17CA         | 17                              | 18.9                                    | 20.9   | 1               | 27.6   | 54.4                             | 1  | GER             | BER        |
| SMCJ18A           | SMCJ18CA         | 18                              | 20.0                                    | 22.1   | 1               | 29.2   | 51.4                             | 1  | GET             | BET        |
| SMCJ20A           | SMCJ20CA         | 20                              | 22.2                                    | 24.5   | 1               | 32.4   | 46.3                             | 1  | GEV             | BEV        |
| SMCJ22A           | SMCJ22CA         | 22                              | 24.4                                    | 26.9   | 1               | 35.5   | 42.3                             | 1  | GEX             | BEX        |
| SMCJ24A           | SMCJ24CA         | 24                              | 26.7                                    | 29.5   | 1               | 38.9   | 38.6                             | 1  | GEZ             | BEZ        |
| SMCJ26A           | SMCJ26CA         | 26                              | 28.9                                    | 31.9   | 1               | 42.1   | 35.7                             | 1  | GFE             | BFE        |
| SMCJ28A           | SMCJ28CA         | 28                              | 31.1                                    | 34.4   | 1               | 45.4   | 33.1                             | 1  | GFG             | BFG        |
| SMCJ30A           | SMCJ30CA         | 30                              | 33.3                                    | 36.8   | 1               | 48.4   | 31.0                             | 1  | GFK             | BFK        |
| SMCJ33A           | SMCJ33CA         | 33                              | 36.7                                    | 40.6   | 1               | 53.3   | 28.2                             | 1  | GFM             | BFM        |
| SMCJ36A           | SMCJ36CA         | 36                              | 40.0                                    | 44.2   | 1               | 58.1   | 25.9                             | 1  | GFP             | BFP        |
| SMCJ40A           | SMCJ40CA         | 40                              | 44.4                                    | 49.1   | 1               | 64.5   | 23.3                             | 1  | GFR             | BFR        |
| SMCJ43A           | SMCJ43CA         | 43                              | 47.8                                    | 52.8   | 1               | 69.4   | 21.7                             | 1  | GFT             | BFT        |
| SMCJ45A           | SMCJ45CA         | 45                              | 50.0                                    | 55.3   | 1               | 72.7   | 20.6                             | 1  | GFV             | BFV        |
| SMCJ48A           | SMCJ48CA         | 48                              | 53.3                                    | 58.9   | 1               | 77.4   | 19.4                             | 1  | GFX             | BFX        |

Note: For bidirectional type having  $V_{RWM}$  of 10 volts and under, the  $I_R$  limit is doubled.

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

| Part No.<br>(Uni) | Part No.<br>(Bi) | Reverse Stand off Voltage | Breakage Voltage $V_{BR}$ @ $I_T$ |        | Test Current | Maximum Clamping Voltage $V_C$ @ $I_{pp}$ | Maximum Peak Pulse Current | Maximum Reverse Leakage $I_R$ @ $V_{RWM}$ | Marking Code |     |
|-------------------|------------------|---------------------------|-----------------------------------|--------|--------------|---|----------------------------|---|--------------|-----|
|                   |                  | $V_{RWM}$ (V)             | Min(V)                            | Max(V) | $I_T$ (mA)   | $V_C$ (V)                                 | $I_{pp}$ (A)               | $I_R$ ( $\mu\text{A}$ )                   | UNI          | BI  |
| SMCJ51A           | SMCJ51CA         | 51                        | 56.7                              | 62.7   | 1            | 82.4                                      | 18.2                       | 1   | GFZ          | BFZ |
| SMCJ54A           | SMCJ54CA         | 54                        | 60.0                              | 66.3   | 1            | 87.1                                      | 17.3                       | 1   | GGE          | BGE |
| SMCJ58A           | SMCJ58CA         | 58                        | 64.4                              | 71.2   | 1            | 93.6                                      | 16.1                       | 1   | GGG          | BGG |
| SMCJ60A           | SMCJ60CA         | 60                        | 66.7                              | 73.7   | 1            | 96.8                                      | 15.5                       | 1   | GGK          | BGK |
| SMCJ64A           | SMCJ64CA         | 64                        | 71.1                              | 78.6   | 1            | 103                                       | 14.6                       | 1   | GGM          | BGM |
| SMCJ70A           | SMCJ70CA         | 70                        | 77.8                              | 86.0   | 1            | 113                                       | 13.3                       | 1   | GGP          | BGP |
| SMCJ75A           | SMCJ75CA         | 75                        | 83.3                              | 92.1   | 1            | 121                                       | 12.4                       | 1   | GGR          | BGR |
| SMCJ78A           | SMCJ78CA         | 78                        | 86.7                              | 95.8   | 1            | 126                                       | 11.9                       | 1   | GGT          | BGT |
| SMCJ85A           | SMCJ85CA         | 85                        | 94.4                              | 104    | 1            | 137                                       | 11.0                       | 1   | GGV          | BGV |
| SMCJ90A           | SMCJ90CA         | 90                        | 100                               | 111    | 1            | 146                                       | 10.3                       | 1   | GGX          | BGX |
| SMCJ100A          | SMCJ100CA        | 100                       | 111                               | 123    | 1            | 162                                       | 9.3                        | 1   | GGZ          | BGZ |
| SMCJ110A          | SMCJ110CA        | 110                       | 122                               | 135    | 1            | 177                                       | 8.5                        | 1   | GHE          | BHE |
| SMCJ120A          | SMCJ120CA        | 120                       | 133                               | 147    | 1            | 193                                       | 7.8                        | 1   | GHG          | BHG |
| SMCJ130A          | SMCJ130CA        | 130                       | 144                               | 159    | 1            | 209                                       | 7.2                        | 1   | GHK          | BHK |
| SMCJ150A          | SMCJ150CA        | 150                       | 167                               | 185    | 1            | 243                                       | 6.2                        | 1   | GHM          | BHM |
| SMCJ160A          | SMCJ160CA        | 160                       | 178                               | 197    | 1            | 259                                       | 5.8                        | 1   | GHP          | BHP |
| SMCJ170A          | SMCJ170CA        | 170                       | 189                               | 209    | 1            | 275                                       | 5.5                        | 1   | GHR          | BHR |
| SMCJ180A          | SMCJ180CA        | 180                       | 201                               | 222    | 1            | 292                                       | 5.1                        | 1   | GHT          | BHT |
| SMCJ190A          | SMCJ190CA        | 190                       | 209                               | 243    | 1            | 308                                       | 4.8                        | 1   | GHV          | BHV |
| SMCJ200A          | SMCJ200CA        | 200                       | 224                               | 247    | 1            | 324                                       | 4.6                        | 1   | GHW          | BHW |
| SMCJ220A          | SMCJ220CA        | 220                       | 246                               | 272    | 1            | 356                                       | 4.2                        | 1   | GHX          | BHX |
| SMCJ250A          | SMCJ250CA        | 250                       | 279                               | 309    | 1            | 405                                       | 3.7                        | 1   | GHZ          | BHZ |
| SMCJ300A          | SMCJ300CA        | 300                       | 335                               | 371    | 1            | 486                                       | 3.1                        | 1   | GJE          | BJE |
| SMCJ350A          | SMCJ350CA        | 350                       | 391                               | 432    | 1            | 567                                       | 2.6                        | 1   | GJG          | BJG |
| SMCJ400A          | SMCJ400CA        | 400                       | 447                               | 494    | 1            | 648                                       | 2.3                        | 1   | GJK          | BJK |
| SMCJ440A          | SMCJ440CA        | 440                       | 492                               | 543    | 1            | 713                                       | 2.1                        | 1   | GJM          | BJM |

Note: For bidirectional type having  $V_{RWM}$  of 10 volts and under, the  $I_R$  limit is doubled.

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### Rate and Characteristic Curve ( $T_A=25^\circ\text{C}$ unless otherwise noted)

FIG.1 - PULSE RATING CURVE

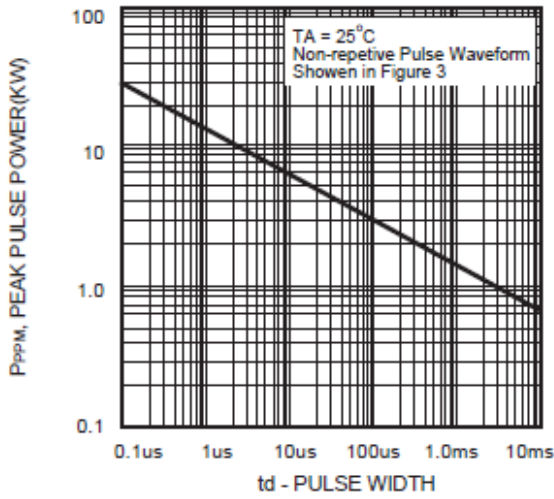


FIG.2 - PULSE DERATING CURVE

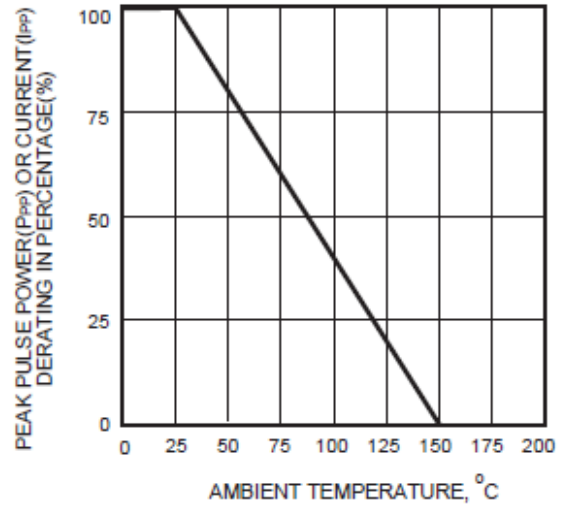


FIG.3 - PULSE WAVEFORM

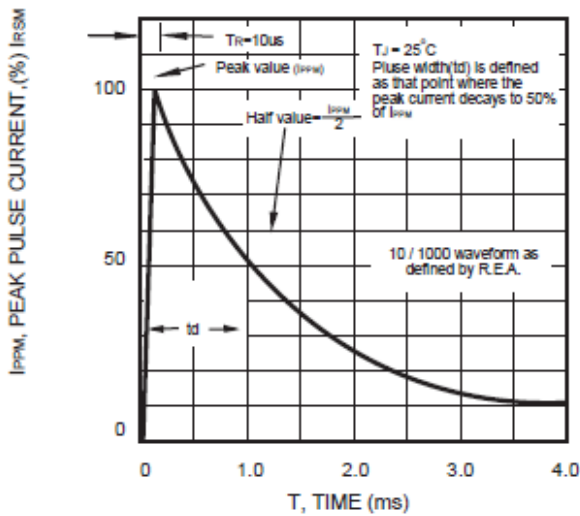


FIG.4 - TYPICAL JUNCTION CAPACITANCE

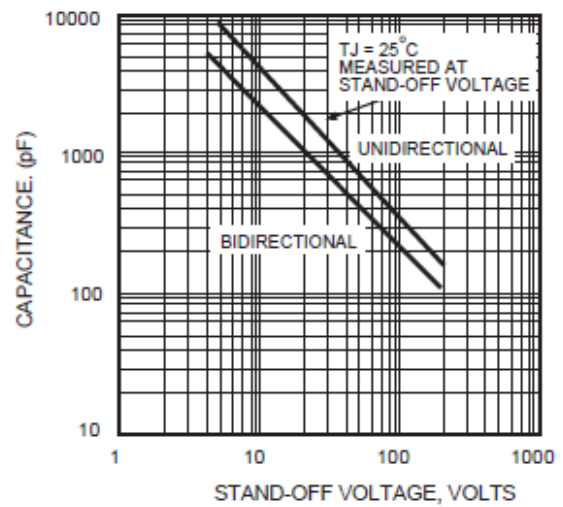
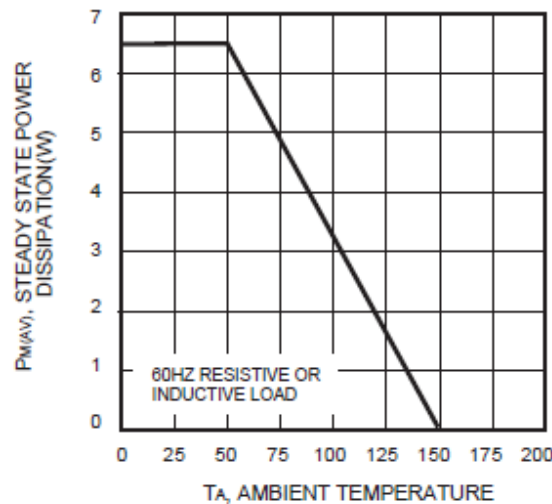


FIG.5 - STEADY STATE POWER DERATING CURVE

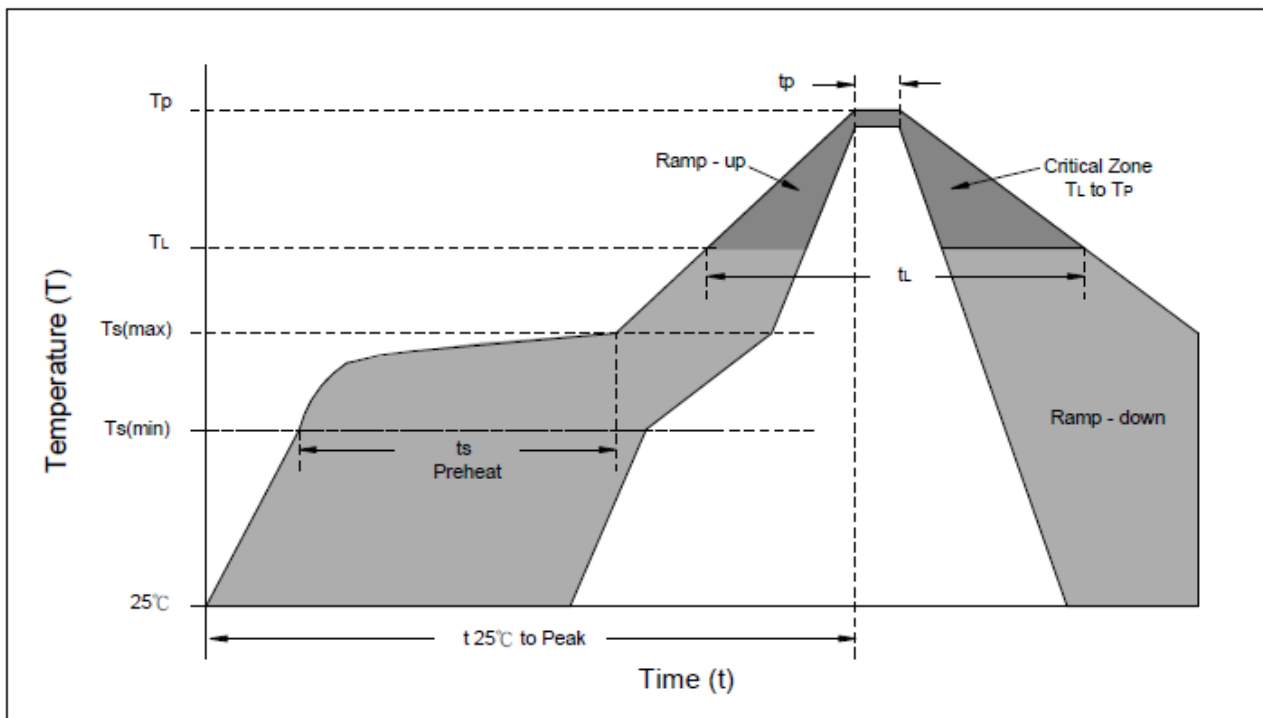


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### ■ Soldering Recommendation



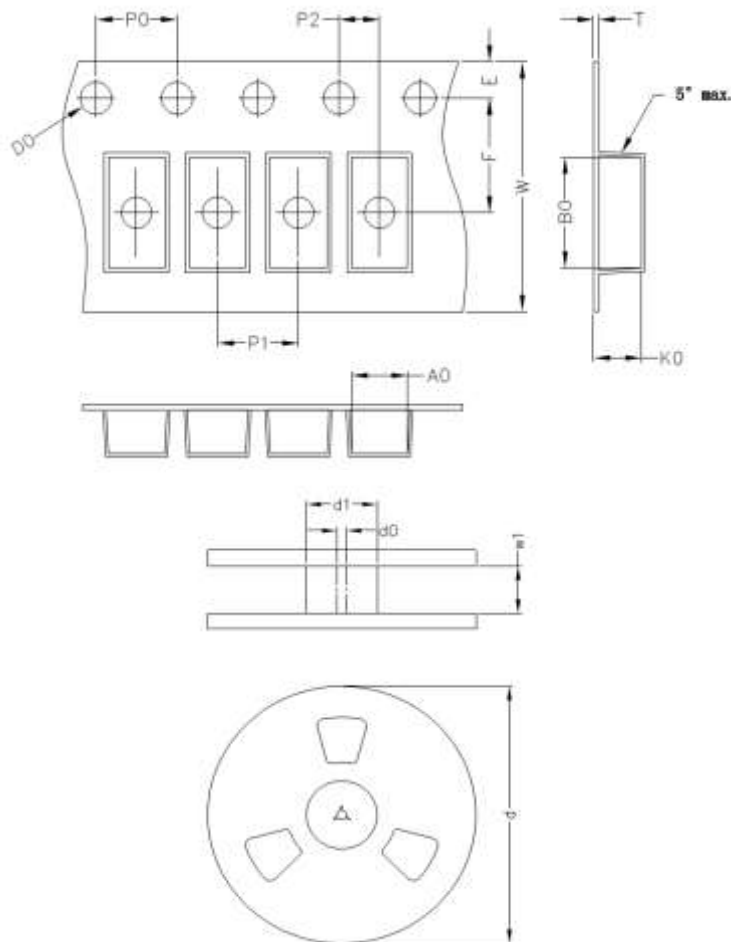
| Reflow Condition  | Lead-free assembly                 |
|---|------------------------------------|
| <b>Preheat</b><br>-Temperature Min(Ts min)<br>-Temperature Min(Ts max)<br>-Time (min to max) (ts) | 150°C<br>200°C<br>60 – 180 seconds |
| <b>Average ramp up rate</b><br>-Temperature Liquidus (TL) to peak                                 | 3°C/second max                     |
| <b>Ts(max) to TL</b><br>-Ramp-up Rate   | 3°C/second max.                    |
| <b>Reflow</b><br>-Temperature Liquidus (TL)<br>-Time (tL)   | 217°C<br>60 – 150 seconds          |
| <b>Peak Temperature (TP)</b>  | 260°C                              |
| <b>Time within 5°C of actual peak Temperature(TP)</b>   | 20 – 40 seconds                    |
| <b>Ramp-down Rate</b>   | 6°C/second max.                    |
| <b>Time 25°C to peak Temperature(TP)</b>  | 8 minutes max.                     |
| <b>Do not exceed</b>  | 260°C                              |

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### ■ Packaging



| Item                   | Symbol  | DO-214AB (SMC)<br>Unit: mm |
|------------------------|---------|----------------------------|
| Carrier width          | A0      | 6.05                       |
| Carrier length         | B0      | 8.31                       |
| Carrier depth          | K0      | 2.54                       |
| Sprocket hole          | D0      | 1.55                       |
| Sprocket hole position | E       | 1.75                       |
| Punch hole position    | F       | 7.50                       |
| Sprocket hole pitch    | P0      | 4.00                       |
| Carrier pitch          | P1      | 8.00                       |
| Embossment center      | P2      | 2.00                       |
| Tape thickness         | T       | 0.25                       |
| Tape width             | W       | 16.00                      |
| Reel outside diameter  | d (13") | 330.00                     |
| Reel inner diameter    | d1      | 75                         |
| Feed hole diameter     | d0      | 13.50                      |
| Reel inner width       | w1      | 17.00                      |

Note: The tolerance of carrier tape and top cover is  $\pm 0.1$ mm, and the tolerance of reel is  $\pm 2$ mm

### ■ Quantity

| Package Type | Reel Size | Reel | Inner Box |
|--------------|-----------|------|-----------|
|              | inch      | Kpcs | Kpcs      |
| DO-214AB     | 13        | 3    | 6         |

### ■ Warehouse Storage Conditions of product

- Storage Condition:
  - Storage Temperature:  $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
  - Relative Humidity:  $\leq 75\% \text{RH}$
  - Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year.