

Transient Voltage Suppression Diodes: SMBJ Series

SMD Type 600 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 1μA above 11V
8. Excellent clamping capacity
9. 600W peak pulse power capability with a 10/1000μs waveform, repetition rate (duty cycle): 0.01%



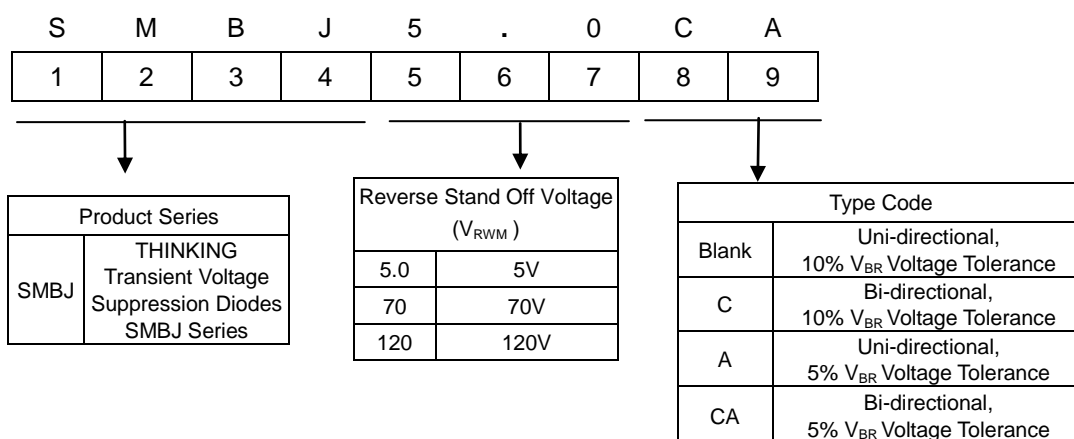
■ Recommended Applications

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

■ Mechanical Data

1. Case: DO-214AA (SMB), 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



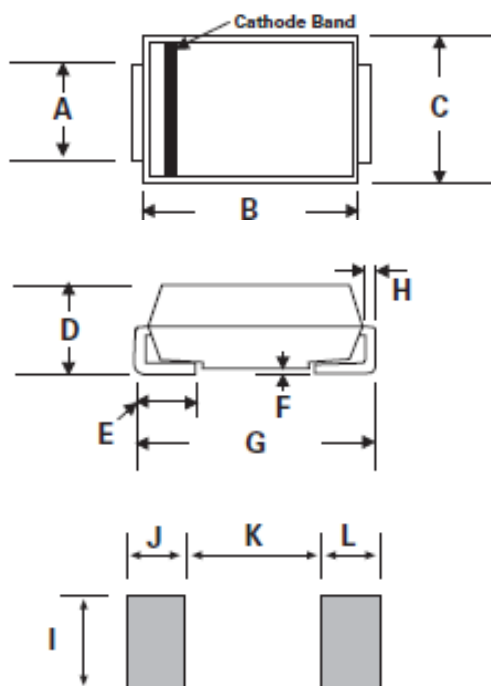
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Structures and Dimensions

SMB/DO-214AA



| Item | Millimeters | | Inches | |
|------|-------------|-------|--------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.91 | 2.20 | 0.075 | 0.086 |
| B | 4.06 | 4.70 | 0.160 | 0.185 |
| C | 3.30 | 3.94 | 0.130 | 0.155 |
| D | 2.13 | 2.70 | 0.083 | 0.096 |
| E | 0.76 | 1.52 | 0.030 | 0.060 |
| F | - | 0.203 | - | 0.008 |
| G | 5.08 | 5.59 | 0.200 | 0.220 |
| H | 0.152 | 0.305 | 0.006 | 0.012 |
| I | 2.26 | - | 0.089 | - |
| J/L | 2.16 | - | 0.085 | - |
| K | - | 2.74 | - | 0.107 |

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 μs waveform (Note1, Fig.1) | P_{PPM} | 600 | W |
| Peak pulse current of on 10/1000 μs waveform (Note1, Fig.3) | I_{PPM} | See Table | A |
| Peak forward surge current, 8.3ms single half sine wave on rated load (Note 2, Fig.6) | I_{FSM} | 100 | A |
| Steady state power dissipation at $T_A=50^\circ\text{C}$ (Fig.5) | $PM_{(AV)}$ | 5.0 | 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. (Uni) | Part No. (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) |
| SMBJ5.0A | SMBJ5.0CA | 5.0 | 6.40 | 7.00 | 10 | 9.2 | 65.3 | 800 | KE | AE |
| SMBJ6.0A | SMBJ6.0CA | 6.0 | 6.67 | 7.37 | 10 | 10.3 | 58.3 | 800 | KG | AG |
| SMBJ6.5A | SMBJ6.5CA | 6.5 | 7.22 | 7.98 | 10 | 11.2 | 53.6 | 500 | KK | AK |
| SMBJ7.0A | SMBJ7.0CA | 7.0 | 7.78 | 8.60 | 10 | 12.0 | 50.0 | 200 | KM | AM |
| SMBJ7.5A | SMBJ7.5CA | 7.5 | 8.33 | 9.21 | 1 | 12.9 | 46.6 | 100 | KP | AP |
| SMBJ8.0A | SMBJ8.0CA | 8.0 | 8.89 | 9.83 | 1 | 13.6 | 44.2 | 50 | KR | AR |
| SMBJ8.5A | SMBJ8.5CA | 8.5 | 9.44 | 10.4 | 1 | 14.4 | 41.7 | 20 | KT | AT |
| SMBJ9.0A | SMBJ9.0CA | 9.0 | 10.0 | 11.1 | 1 | 15.4 | 39.0 | 10 | KV | AV |
| SMBJ10A | SMBJ10CA | 10 | 11.1 | 12.3 | 1 | 17.0 | 35.3 | 5 | KX | AX |
| SMBJ11A | SMBJ11CA | 11 | 12.2 | 13.5 | 1 | 18.2 | 33.0 | 1 | KZ | AZ |
| SMBJ12A | SMBJ12CA | 12 | 13.3 | 14.7 | 1 | 19.9 | 30.2 | 1 | LE | BE |
| SMBJ13A | SMBJ13CA | 13 | 14.4 | 15.9 | 1 | 21.5 | 28.0 | 1 | LG | BG |
| SMBJ14A | SMBJ14CA | 14 | 15.6 | 17.2 | 1 | 23.2 | 25.9 | 1 | LK | BK |
| SMBJ15A | SMBJ15CA | 15 | 16.7 | 18.5 | 1 | 24.4 | 24.6 | 1 | LM | BM |
| SMBJ16A | SMBJ16CA | 16 | 17.8 | 19.7 | 1 | 26.0 | 23.1 | 1 | LP | BP |
| SMBJ17A | SMBJ17CA | 17 | 18.9 | 20.9 | 1 | 27.6 | 21.8 | 1 | LR | BR |
| SMBJ18A | SMBJ18CA | 18 | 20.0 | 22.1 | 1 | 29.2 | 20.6 | 1 | LT | BT |
| SMBJ20A | SMBJ20CA | 20 | 22.2 | 24.5 | 1 | 32.4 | 18.6 | 1 | LV | BV |
| SMBJ22A | SMBJ22CA | 22 | 24.4 | 26.9 | 1 | 35.5 | 16.9 | 1 | LX | BX |
| SMBJ24A | SMBJ24CA | 24 | 26.7 | 29.5 | 1 | 38.9 | 15.5 | 1 | LZ | BZ |
| SMBJ26A | SMBJ26CA | 26 | 28.9 | 31.9 | 1 | 42.1 | 14.3 | 1 | ME | CE |
| SMBJ28A | SMBJ28CA | 28 | 31.1 | 34.4 | 1 | 45.4 | 13.3 | 1 | MG | CG |
| SMBJ30A | SMBJ30CA | 30 | 33.3 | 36.8 | 1 | 48.4 | 12.4 | 1 | MK | CK |
| SMBJ33A | SMBJ33CA | 33 | 36.7 | 40.6 | 1 | 53.3 | 11.3 | 1 | MM | CM |
| SMBJ36A | SMBJ36CA | 36 | 40.0 | 44.2 | 1 | 58.1 | 10.4 | 1 | MP | CP |
| SMBJ40A | SMBJ40CA | 40 | 44.4 | 49.1 | 1 | 64.5 | 9.3 | 1 | MR | CR |
| SMBJ43A | SMBJ43CA | 43 | 47.8 | 52.8 | 1 | 69.4 | 8.7 | 1 | MT | CT |
| SMBJ45A | SMBJ45CA | 45 | 50.0 | 55.3 | 1 | 72.7 | 8.3 | 1 | MV | CV |
| SMBJ48A | SMBJ48CA | 48 | 53.3 | 58.9 | 1 | 77.4 | 7.8 | 1 | MX | CX |

Note: For bidirectional type having VRWM of 10 volts and under, the I_R limit is doubled.

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

| Part No. (Uni) | Part No. (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 @ VRWM | Marking Code | |
|-------------------|------------------|---------------------------|--|----------|-----------------------|--|----------------------------|--|--------------|----|
| | | V _{RWM} (V) | Min(V) | Max(V) | I _T (mA) | V _C (V) | I _{pp} (A) | I _R (μA) | UNI | BI |
| SMBJ51A | SMBJ51CA | 51 | 56.7 | 62.7 | 1 | 82.4 | 7.3 | 1 | MZ | CZ |
| SMBJ54A | SMBJ54CA | 54 | 60.0 | 66.3 | 1 | 87.1 | 6.9 | 1 | NE | DE |
| SMBJ58A | SMBJ58CA | 58 | 64.4 | 71.2 | 1 | 93.6 | 6.5 | 1 | NG | DG |
| SMBJ60A | SMBJ60CA | 60 | 66.7 | 73.7 | 1 | 96.8 | 6.2 | 1 | NK | DK |
| SMBJ64A | SMBJ64CA | 64 | 71.1 | 78.6 | 1 | 103 | 5.9 | 1 | NM | DM |
| SMBJ70A | SMBJ70CA | 70 | 77.8 | 86.0 | 1 | 113 | 5.3 | 1 | NP | DP |
| SMBJ75A | SMBJ75CA | 75 | 83.3 | 92.1 | 1 | 121 | 5.0 | 1 | NR | DR |
| SMBJ78A | SMBJ78CA | 78 | 86.7 | 95.8 | 1 | 126 | 4.8 | 1 | NT | DT |
| SMBJ85A | SMBJ85CA | 85 | 94.4 | 104 | 1 | 137 | 4.4 | 1 | NV | DV |
| SMBJ90A | SMBJ90CA | 90 | 100 | 111 | 1 | 146 | 4.1 | 1 | NX | DX |
| SMBJ100A | SMBJ100CA | 100 | 111 | 123 | 1 | 162 | 3.7 | 1 | NZ | DZ |
| SMBJ110A | SMBJ110CA | 110 | 122 | 135 | 1 | 177 | 3.4 | 1 | PE | EE |
| SMBJ120A | SMBJ120CA | 120 | 133 | 147 | 1 | 193 | 3.1 | 1 | PG | EG |
| SMBJ130A | SMBJ130CA | 130 | 144 | 159 | 1 | 209 | 2.9 | 1 | PK | EK |
| SMBJ150A | SMBJ150CA | 150 | 167 | 185 | 1 | 243 | 2.5 | 1 | PM | EM |
| SMBJ160A | SMBJ160CA | 160 | 178 | 197 | 1 | 259 | 2.3 | 1 | PP | EP |
| SMBJ170A | SMBJ170CA | 170 | 189 | 209 | 1 | 275 | 2.2 | 1 | PR | ER |
| SMBJ180A | SMBJ180CA | 180 | 201 | 222 | 1 | 292 | 2.1 | 1 | PT | ET |
| SMBJ190A | SMBJ190CA | 190 | 209 | 243 | 1 | 308 | 2.0 | 1 | PV | EV |
| SMBJ200A | SMBJ200CA | 200 | 224 | 247 | 1 | 324 | 1.9 | 1 | PW | EW |
| SMBJ220A | SMBJ220CA | 220 | 246 | 272 | 1 | 356 | 1.7 | 1 | PX | EX |
| SMBJ250A | SMBJ250CA | 250 | 279 | 309 | 1 | 405 | 1.5 | 1 | PZ | EZ |
| SMBJ300A | SMBJ300CA | 300 | 335 | 371 | 1 | 486 | 1.3 | 1 | QE | FE |
| SMBJ350A | SMBJ350CA | 350 | 391 | 432 | 1 | 567 | 1.1 | 1 | QG | FG |
| SMBJ400A | SMBJ400CA | 400 | 447 | 494 | 1 | 648 | 0.9 | 1 | QK | FK |
| SMBJ440A | SMBJ440CA | 440 | 492 | 543 | 1 | 713 | 0.9 | 1 | QM | FM |

Notes: For bidirectional type having VRWM 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

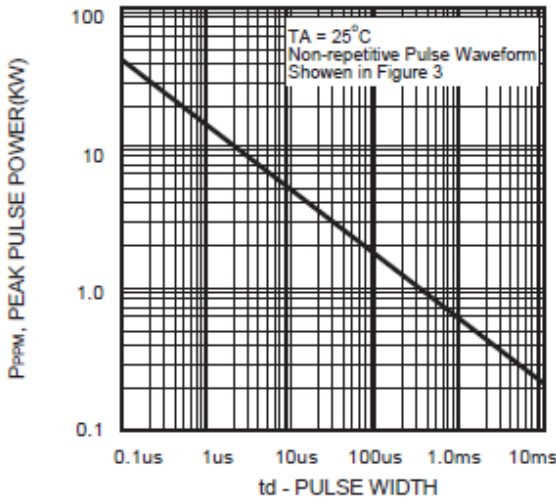


FIG.2 - PULSE DERATING CURVE

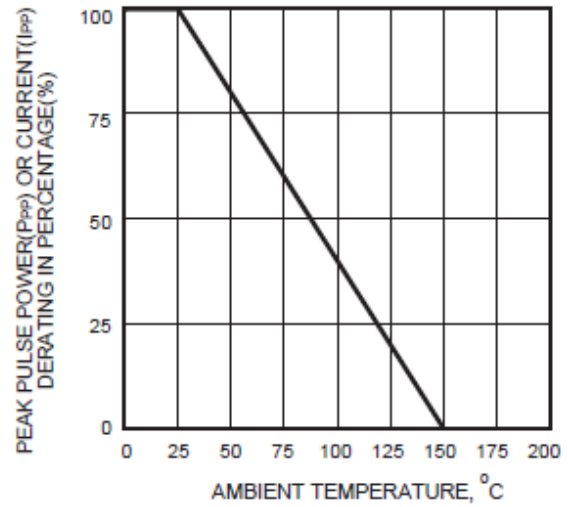


FIG.3 - PULSE WAVEFORM

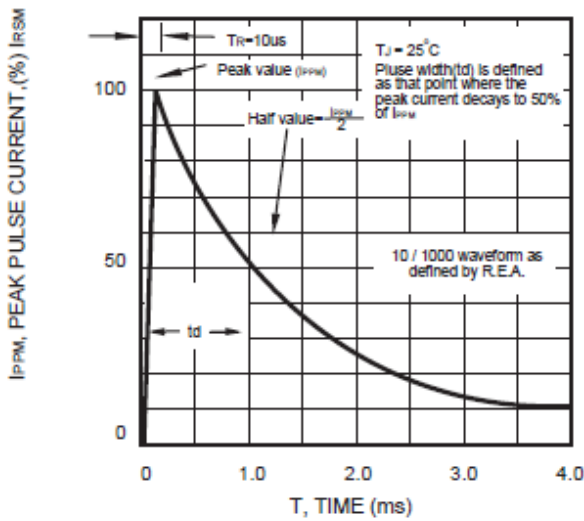


FIG.4 - TYPICAL JUNCTION CAPACITANCE

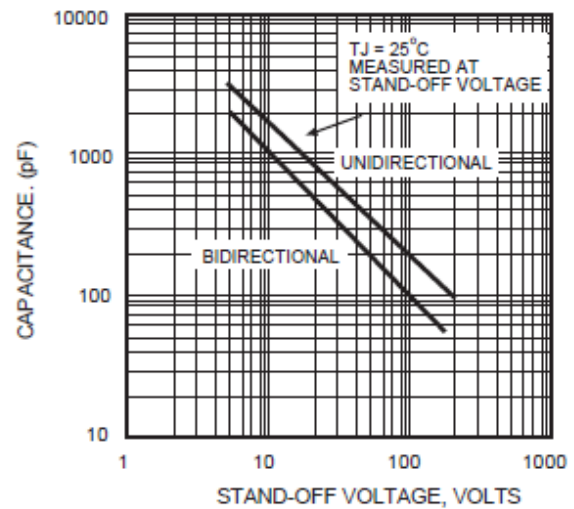
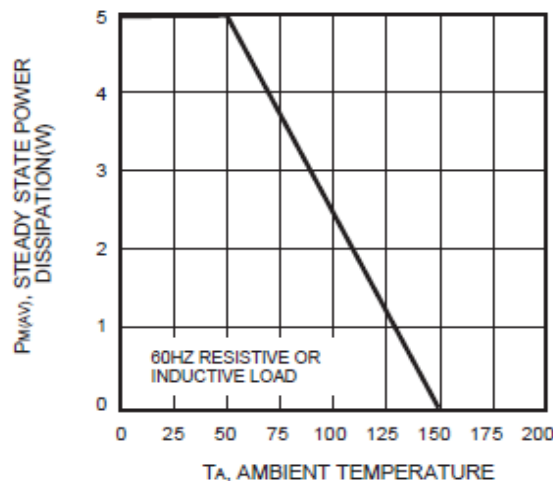


FIG.5 - STEADY STATE POWER DERATING CURVE

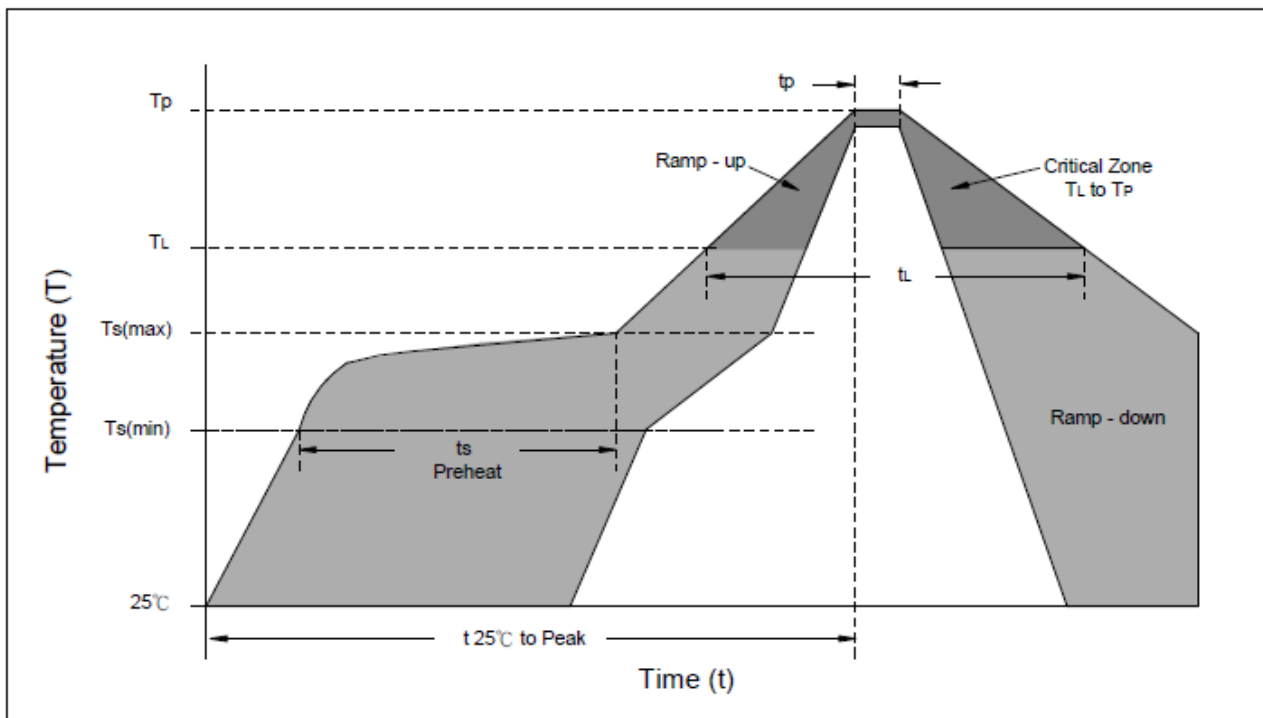


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■ Soldering Recommendation



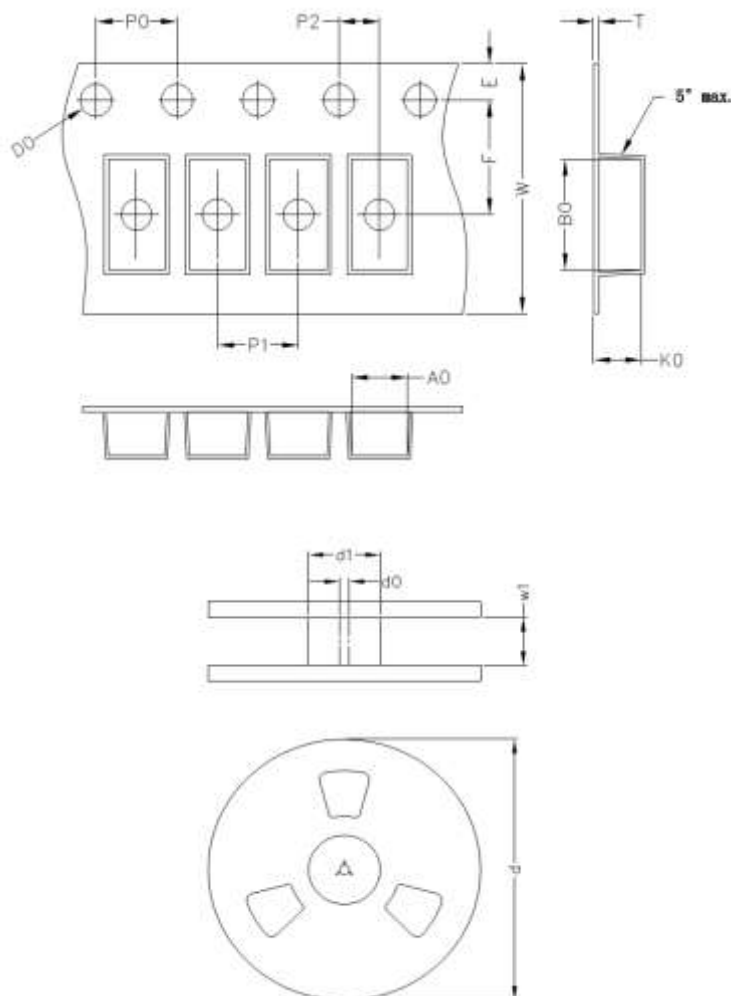
| Reflow Condition | Lead-free assembly |
|---|------------------------------------|
| Preheat -Temperature Min(Ts min) -Temperature Min(Ts max) -Time (min to max) (ts) | 150°C 200°C 60 – 180 seconds |
| Average ramp up rate -Temperature Liquidus (TL) to peak | 3°C/second max |
| Ts(max) to TL -Ramp-up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

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■ Packaging



| Item | Symbol | DO-214AA (SMB) Unit: mm |
|------------------------|---------|----------------------------|
| Carrier width | A0 | 3.65±0.1 |
| Carrier length | B0 | 5.6±0.1 |
| Carrier depth | K0 | 2.57±0.1 |
| Sprocket hole | D0 | 1.55 |
| Sprocket hole position | E | 1.75 |
| Punch hole position | F | 5.50 |
| Sprocket hole pitch | P0 | 4.00 |
| Carrier pitch | P1 | 8.00 |
| Embossment center | P2 | 2.00 |
| Tape thickness | T | 0.25 |
| Tape width | W | 12.00 |
| Reel outside diameter | d (13") | 330.00 |
| Reel inner diameter | d1 | 75 |
| Feed hole diameter | d0 | 13.50 |
| Reel inner width | w1 | 13.50 |

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

■ Quantity

| Package Type | Reel Size | Reel | Inner Box |
|--------------|-----------|------|-----------|
| | inch | Kpcs | Kpcs |
| DO-214AA | 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.