# 1 Characteristics

**Table 1. Absolute maximum ratings ($T_{amb}$ = 25 °C)**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{PP}$ | Peak pulse voltage | IEC 61000-4-2 (C = 150 pF, R = 330 Ω)<br>Contact discharge<br>Air discharge | <br>30<br>30 | kV |
| $P_{PP}$ | Peak pulse power dissipation | 10/1000 µs, $T_j$ initial = $T_{amb}$ | 600 | W |
| $T_{stg}$ | Storage temperature range | | -65 to +150 | °C |
| $T_j$ | Operating junction temperature range | | -55 to +150 | °C |
| $T_L$ | Maximum lead temperature for soldering during 10 s | | 260 | °C |

**Figure 1. Electrical characteristics - parameter definitions**

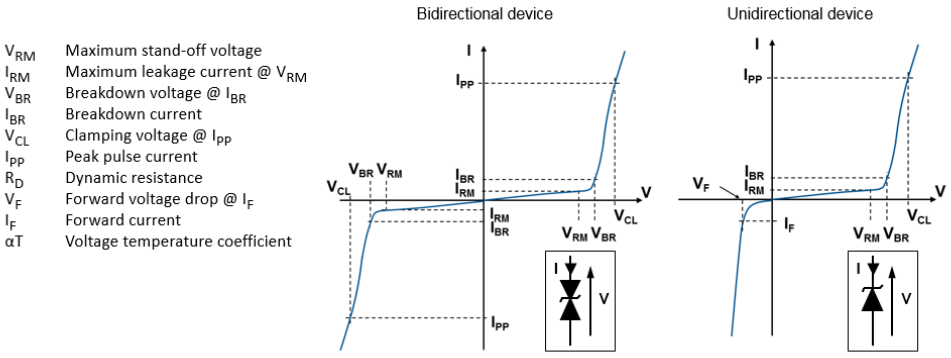


**Figure 2. Pulse definition for electrical characteristics**

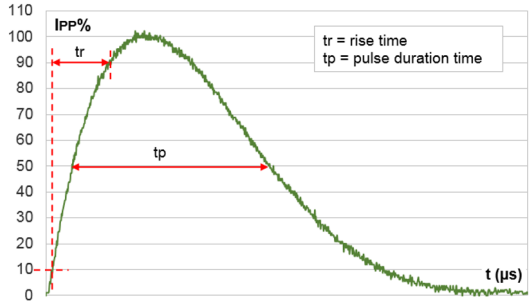



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**Table 2. Electrical characteristics - parameter values ($T_{amb}$ = 25 °C, unless otherwise specified)**

| Type | $I_{RM}$ max at $V_{RM}$ | | | $V_{BR}$ at $I_{BR}$ (1) | | | 10 / 1000 µs | | | 8 / 20µs | | | αT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | $V_{CL}$ (2)(3) | $I_{PP}$ (4) | $R_D$ | $V_{CL}$ (2)(3) | $I_{PP}$ (4) | $R_D$ | |
| | 25 °C | 85 °C | | Min. | Typ. | | Max. | | Max. | Max. | | Max. | Max. |
| | µA | | V | V | | mA | V | A | Ω | V | A | Ω | $10^{-4}$/°C |
| SMBJ5.0A/CA | 20 | 50 | 5.0 | 6.40 | 6.74 | 10 | 9.2 | 68 | 0.031 | 14.4 | 275 | 0.027 | 5.7 |
| SMBJ6.0A/CA | 20 | 50 | 6.0 | 6.70 | 7.05 | 10 | 10.3 | 61 | 0.048 | 14.8 | 270 | 0.027 | 5.9 |
| SMBJ6.5A/CA | 20 | 50 | 6.5 | 7.20 | 7.58 | 10 | 11.2 | 56 | 0.058 | 15.2 | 266 | 0.027 | 6.1 |
| SMBJ8.5A/CA | 20 | 50 | 8.5 | 9.40 | 9.90 | 1 | 14.4 | 41.7 | 0.096 | 19.5 | 205 | 0.044 | 7.3 |
| SMBJ10A/CA | 0.2 | 1 | 10 | 11.1 | 11.7 | 1 | 17 | 37 | 0.127 | 21.7 | 184 | 0.051 | 7.8 |
| SMBJ12A/CA | 0.2 | 1 | 12 | 13.3 | 14.0 | 1 | 19.9 | 31 | 0.168 | 25.3 | 157 | 0.068 | 8.3 |
| SMBJ13A/CA | 0.2 | 1 | 13 | 14.4 | 15.2 | 1 | 21.5 | 29 | 0.191 | 27.2 | 147 | 0.076 | 8.4 |
| SMBJ15A/CA | 0.2 | 1 | 15 | 16.7 | 17.6 | 1 | 24.4 | 25.1 | 0.236 | 32.5 | 123 | 0.114 | 8.8 |
| SMBJ16A/CA | 0.2 | 1 | 16 | 17.8 | 18.7 | 1 | 26 | 23.1 | 0.276 | 34.4 | 116 | 0.127 | 8.8 |
| SMBJ18A/CA | 0.2 | 1 | 18 | 20.0 | 21.1 | 1 | 29.2 | 21.5 | 0.328 | 39.3 | 102 | 0.168 | 9.2 |
| SMBJ20A/CA | 0.2 | 1 | 20 | 22.2 | 23.4 | 1 | 32.4 | 19.4 | 0.404 | 42.8 | 93 | 0.196 | 9.4 |
| SMBJ22A/CA | 0.2 | 1 | 22 | 24.4 | 25.7 | 1 | 35.5 | 17.7 | 0.481 | 48.3 | 83 | 0.257 | 9.6 |
| SMBJ24A/CA | 0.2 | 1 | 24 | 26.7 | 28.1 | 1 | 38.9 | 16 | 0.587 | 50 | 80 | 0.256 | 9.6 |
| SMBJ26A/CA | 0.2 | 1 | 26 | 28.9 | 30.4 | 1 | 42.1 | 14.9 | 0.683 | 53.5 | 75 | 0.288 | 9.7 |
| SMBJ28A/CA | 0.2 | 1 | 28 | 31.1 | 32.7 | 1 | 45.4 | 13.8 | 0.802 | 59 | 68 | 0.363 | 9.8 |
| SMBJ30A/CA | 0.2 | 1 | 30 | 33.3 | 35.1 | 1 | 48.4 | 13 | 0.888 | 64.3 | 62 | 0.443 | 9.9 |
| SMBJ33A/CA | 0.2 | 1 | 33 | 36.7 | 38.6 | 1 | 53.3 | 11.8 | 1.08 | 69.7 | 57 | 0.512 | 10.0 |
| SMBJ36A/CA | 0.2 | 1 | 36 | 40.0 | 42.1 | 1 | 58.1 | 10.3 | 1.35 | 76 | 52 | 0.611 | 10.0 |
| SMBJ40A/CA | 0.2 | 1 | 40 | 44.4 | 46.7 | 1 | 64.5 | 9.7 | 1.59 | 84 | 48 | 0.728 | 10.1 |
| SMBJ48A/CA | 0.2 | 1 | 48 | 53.3 | 56.1 | 1 | 77.4 | 8.1 | 2.28 | 100 | 40 | 1.03 | 10.3 |
| SMBJ58A/CA | 0.2 | 1 | 58 | 64.4 | 67.8 | 1 | 93.6 | 6.7 | 3.34 | 121 | 33 | 1.51 | 10.4 |
| SMBJ64A/CA | 0.2 | 1 | 64 | 71.3 | 75 | 1 | 103 | 5.8 | 4.17 | 134 | 30 | 1.84 | 10.5 |
| SMBJ70A/CA | 0.2 | 1 | 70 | 77.8 | 81.9 | 1 | 113 | 5.5 | 4.91 | 146 | 27 | 2.22 | 10.5 |
| SMBJ85A/CA | 0.2 | 1 | 85 | 94 | 99 | 1 | 137 | 4.6 | 7.18 | 178 | 22.5 | 3.29 | 10.6 |
| SMBJ100A/CA | 0.2 | 1 | 100 | 111 | 117 | 1 | 162 | 3.8 | 10.3 | 212 | 19 | 4.69 | 10.7 |
| SMBJ130A/CA | 0.2 | 1 | 130 | 144 | 152 | 1 | 209 | 3 | 16.5 | 265 | 15 | 7.03 | 10.8 |
| SMBJ154A/CA | 0.2 | 1 | 154 | 171 | 180 | 1 | 246 | 2.4 | 23.8 | 317 | 12.6 | 10.2 | 10.8 |
| SMBJ170A/CA | 0.2 | 1 | 170 | 189 | 199 | 1 | 275 | 2.2 | 30.0 | 353 | 11.3 | 12.7 | 10.8 |
| SMBJ188A/CA | 0.2 | 1 | 188 | 209 | 220 | 1 | 328 | 2 | 48.5 | 388 | 10.3 | 15.2 | 10.8 |

1. *To calculate $V_{BR}$ versus $T_j$ : $V_{BR}$ at $T_j$ = $V_{BR}$ at 25 °C x (1 + αT x ($T_j$ - 25))*
2. *To calculate $V_{CL}$ versus $T_j$ : $V_{CL}$ at $T_j$ = $V_{CL}$ at 25 °C x (1 + αT x ($T_j$ - 25))*
3. *To calculate $V_{CL}$ max versus $I_{PPappli}$: $V_{CLmax}$ = $V_{CL}$ - RD x ($I_{PP}$ - $I_{PPappli}$) where $I_{PP\ appli}$ is the surge current in the application*
4. *Surge capability given for both directions for unidirectional and bidirectional devices*


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## 1.1 Characteristics (curves)

**Figure 3. Maximum peak power dissipation versus initial junction temperature**

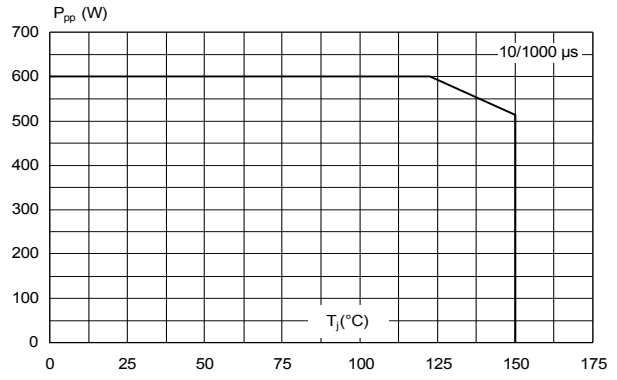


**Figure 4. Maximum peak pulse power versus exponential pulse duration**

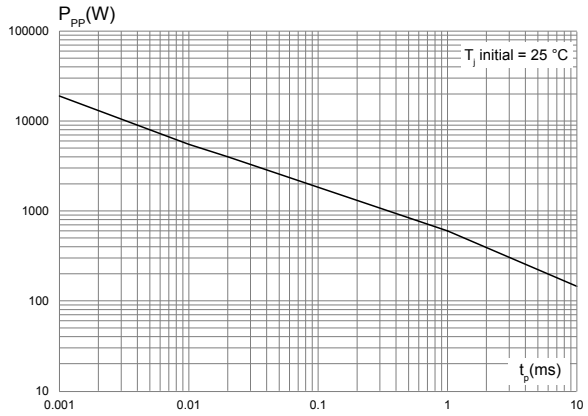


**Figure 5. Maximum peak pulse current versus clamping voltage**

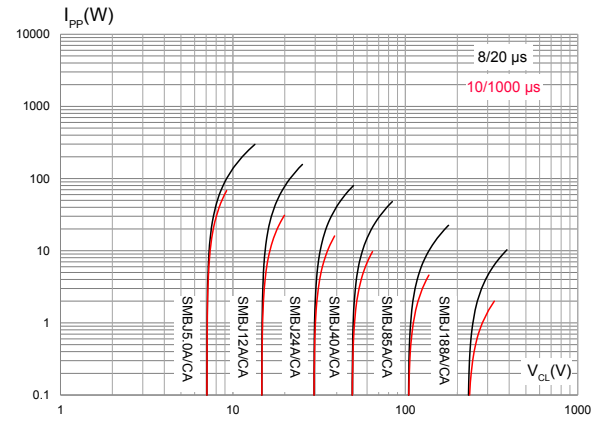


**Figure 6. Dynamic resistance versus pulse duration**

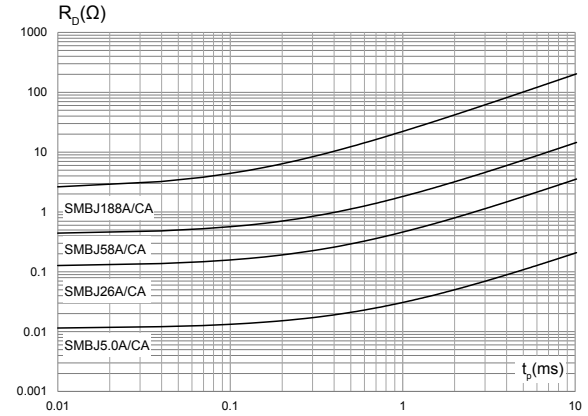


**Figure 7. Junction capacitance versus reverse applied voltage (unidirectional types)**

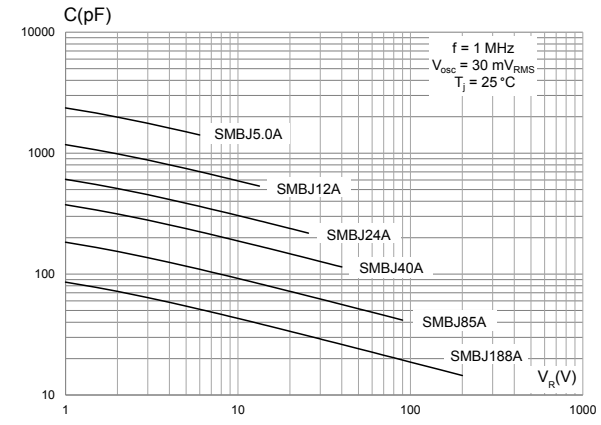


**Figure 8. Junction capacitance versus applied voltage (bidirectional types)**

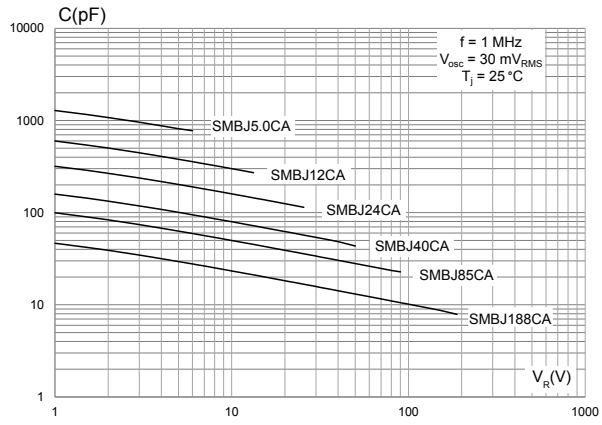



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**Figure 9. Leakage current versus junction temperature**

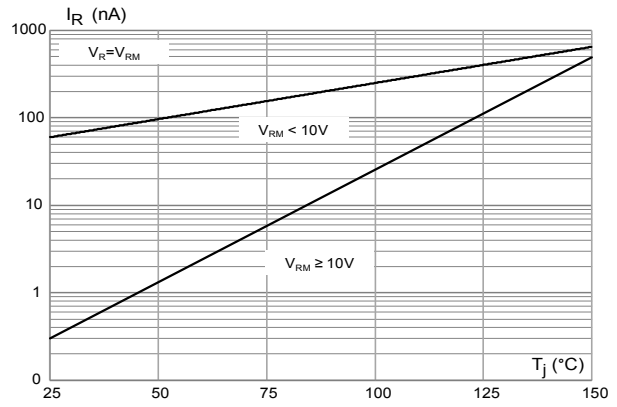



**Figure 10. Peak forward voltage drop versus peak forward current**

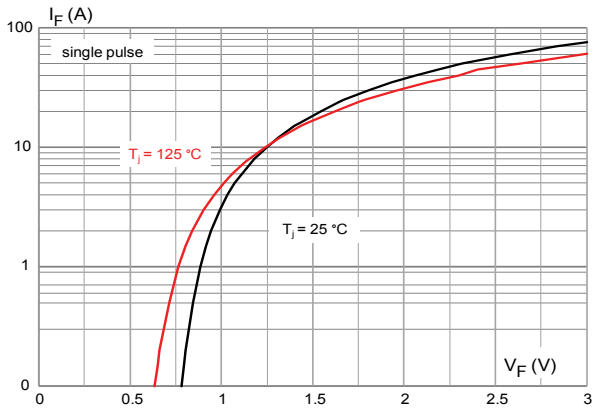



**Figure 11. Thermal impedance junction to ambient versus pulse duration**

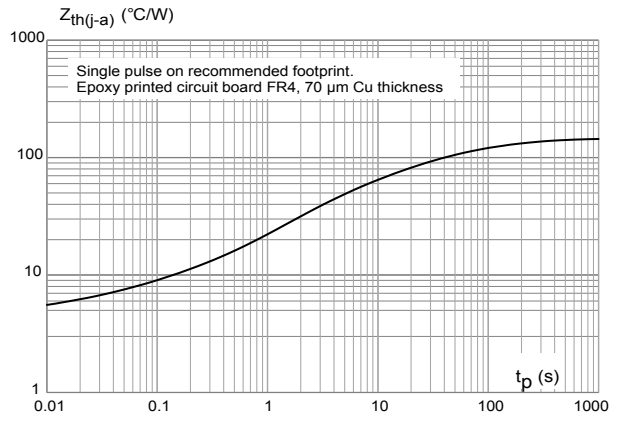
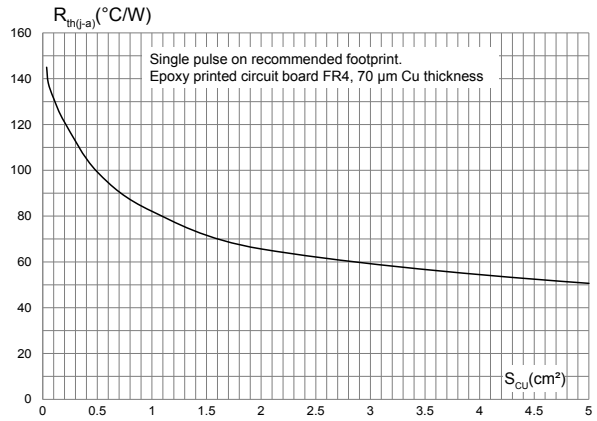



**Figure 12. Thermal resistance junction to ambient versus copper area under each lead**





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# 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

## 2.1 SMB package information

**Figure 13. SMB package outline**

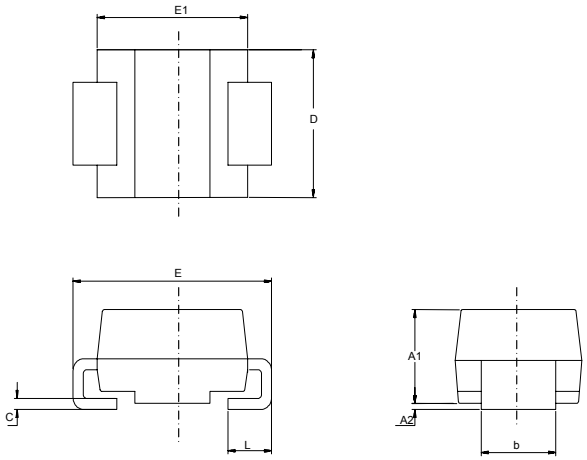


**Table 3. SMB package mechanical data**

| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches[1] | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.0748 | 0.0965 |
| A2 | 0.05 | 0.20 | 0.0020 | 0.0079 |
| b | 1.95 | 2.20 | 0.0768 | 0.0867 |
| c | 0.15 | 0.40 | 0.0059 | 0.0157 |
| D | 3.30 | 3.95 | 0.1299 | 0.1556 |
| E | 5.10 | 5.60 | 0.2008 | 0.2205 |
| E1 | 4.05 | 4.60 | 0.1594 | 0.1811 |
| L | 0.75 | 1.50 | 0.0295 | 0.0591 |

1. *Values in inches are converted from mm*


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**Figure 14. SMB recommended footprint**

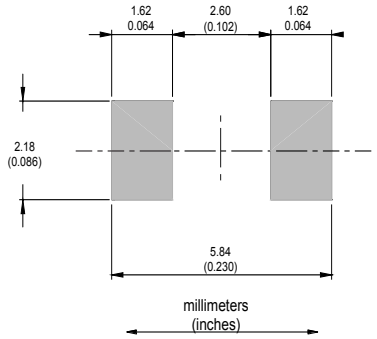
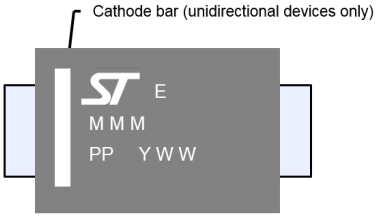
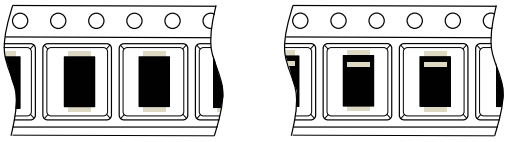



**Figure 15. Marking layout**




**E : ECOPACK grade**
**MMM : Marking**
**PP : Assembly location**
**Y : Year**
**WW : week**

**Figure 16. Package orientation in reel**




Taped according to EIA-481
Pocket dimensions are not on scale.
Pocket shape may vary depending on package
On bidirectional devices, marking and logo may not be always in the same direction.

**Figure 17. Tape and reel orientation**

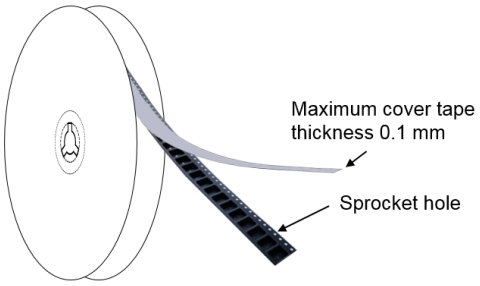



**Figure 18. Reel dimensions (mm)**

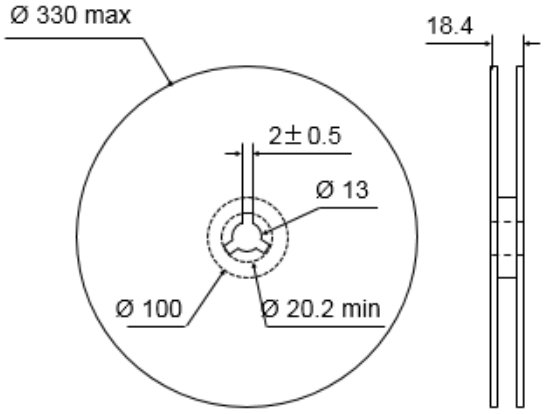



**Figure 19. Inner box dimensions (mm)**

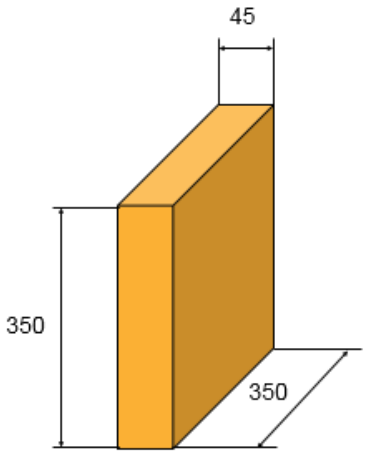




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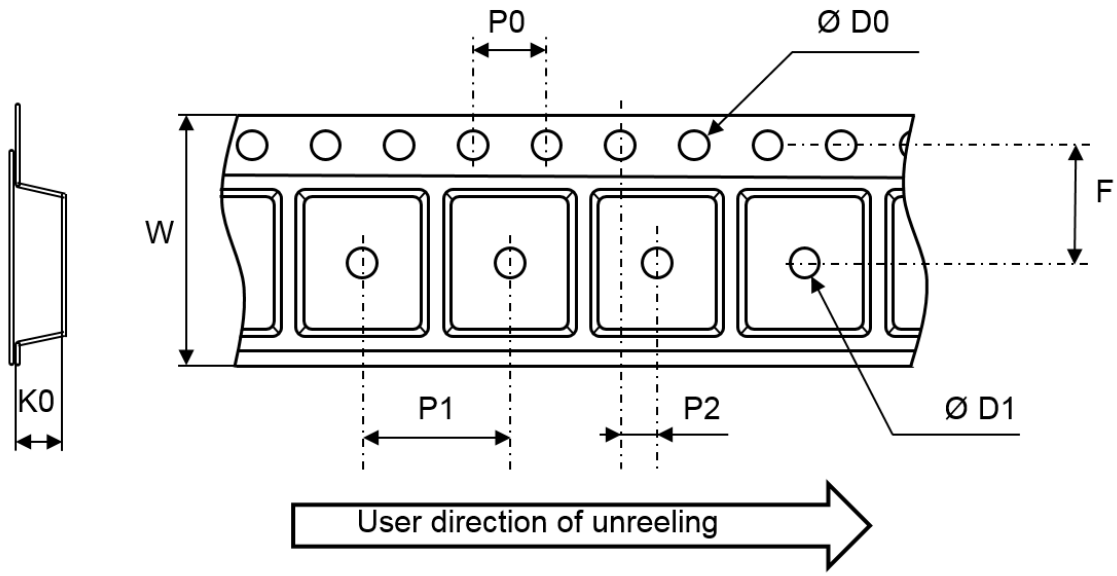
Figure 20. **Tape and reel outline**




Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Table 4. **Tape and reel mechanical data**

| Ref. | Dimensions | | |
|---|---|---|---|
| | Millimeters | | |
| | Min. | Typ. | Max. |
| ØD0 | 1.5 | 1.55 | 1.6 |
| ØD1 | 1.5 | | |
| F | 5.4 | 5.5 | 5.6 |
| K0 | 2.64 | 2.74 | 2.84 |
| P0 | 3.9 | 4.0 | 4.1 |
| P1 | 7.9 | 8.0 | 8.1 |
| P2 | 1.9 | 2.0 | 2.1 |
| W | 11.7 | 12.0 | 12.3 |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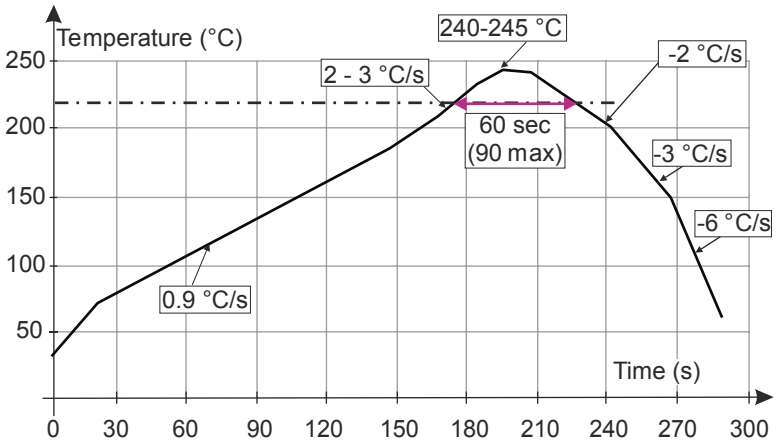
## 2.2 Reflow profile

Figure 21. **ST ECOPACK recommended soldering reflow profile for PCB mounting**




*Note: Minimize air convection currents in the reflow oven to avoid component movement. Maximum soldering profile corresponds to the latest IPC/JEDEC J-STD-020.*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# 3 Ordering information

Figure 22. **Ordering information scheme**

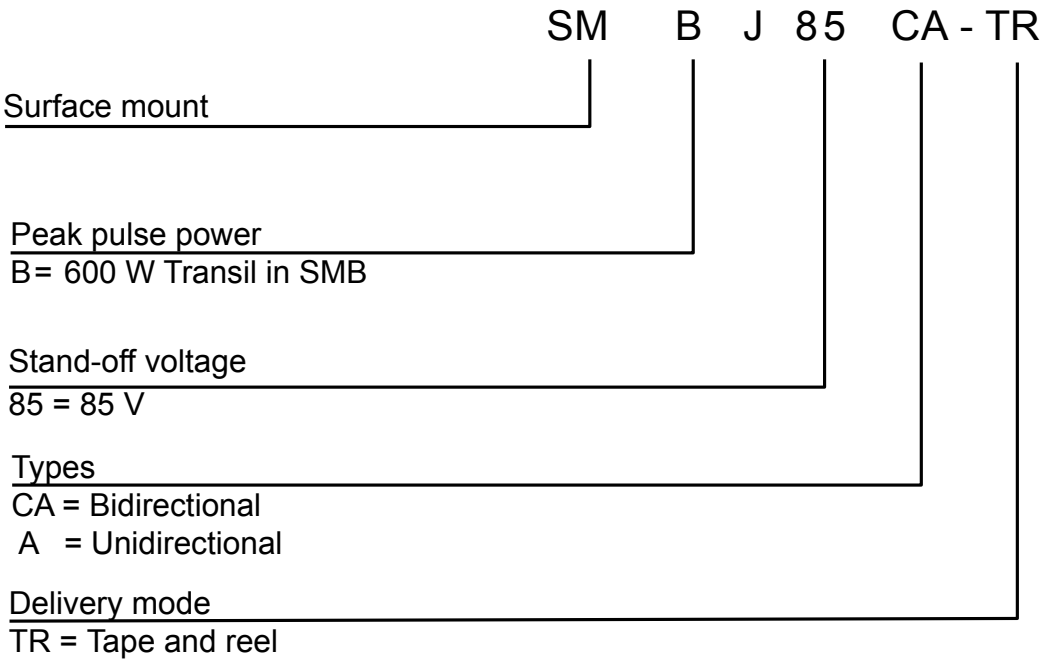


Table 5. **Ordering information**

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---|---|---|---|---|---|
| SMBJxxxA / CA | See Table 6. Marking. | SMB | 0.11 g | 2500 | Tape and reel |


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Table 6. **Marking**

| Order code | Marking | Order code | Marking |
|---|---|---|---|
| SMBJ5.0A | BUZ | SMBJ5.0CA | BBZ |
| SMBJ6.0A | BUA | SMBJ6.0CA | BBA |
| SMBJ6.5A | BUB | SMBJ6.5CA | BBB |
| SMBJ8.5A | BUC | SMBJ8.5CA | BBC |
| SMBJ10A | BUD | SMBJ10CA | BBD |
| SMBJ12A | BUE | SMBJ12CA | BBE |
| SMBJ13A | BUF | SMBJ13CA | BBF |
| SMBJ15A | BUG | SMBJ15CA | BBG |
| SMBJ16A | CUG | SMBJ16CA | CBG |
| SMBJ18A | BUH | SMBJ18CA | BBH |
| SMBJ20A | BUI | SMBJ20CA | BBI |
| SMBJ22A | BVA | SMBJ22CA | CBH |
| SMBJ24A | BUJ | SMBJ24CA | BBJ |
| SMBJ26A | BUK | SMBJ26CA | BBK |
| SMBJ28A | BUL | SMBJ28CA | BBL |
| SMBJ30A | BUM | SMBJ30CA | BBM |
| SMBJ33A | BUN | SMBJ33CA | BBN |
| SMBJ36A | CUN | SMBJ36CA | CBN |
| SMBJ40A | CUJ | SMBJ40CA | CBJ |
| SMBJ48A | BUW | SMBJ48CA | BBW |
| SMBJ58A | BUO | SMBJ58CA | BBO |
| SMBJ64A | BUP | SMBJ64CA | BBP |
| SMBJ70A | CUM | SMBJ70CA | CBM |
| SMBJ85A | BUQ | SMBJ85CA | BBQ |
| SMBJ100A | CUQ | SMBJ100CA | CBQ |
| SMBJ130A | BUS | SMBJ130CA | BBS |
| SMBJ154A | BUT | SMBJ154CA | BBT |
| SMBJ170A | BUU | SMBJ170CA | BBU |
| SMBJ188A | BUV | SMBJ188CA | BBV |


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## Revision history

Table 7. **Document revision history**

| Date | Version | Changes |
|---|---|---|
| Oct-2001 | 4 | Previous issue. |
| 10-Feb-2005 | 5 | Reformatted to current template. Added directional (uni and bi) indications to graphics. Added ECOPACK statement. |
| 16-Nov-2006 | 6 | Add part numbers SMBJ36A-TR and SMBJ36CA-TR in Table 3. |
| 14-May-2009 | 7 | Reformatted to current standards. Updated ECOPACK statement.<br>Added part number SMBJ43CA/A. |
| 17-Sep-2009 | 8 | Document updated for low leakage current. |
| 09-Jul-2010 | 9 | Changed timescale in Figure 9. |
| 20-Oct-2010 | 10 | Updated Figure 13. |
| 24-Jan-2018 | 11 | Updated Table 3: "Electrical characteristics parameter values (Tamb = 25 °C, unless otherwise specified)". |
| 26-Apr-2021 | 12 | Updated Table 6.<br>Minor text changes. |


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