

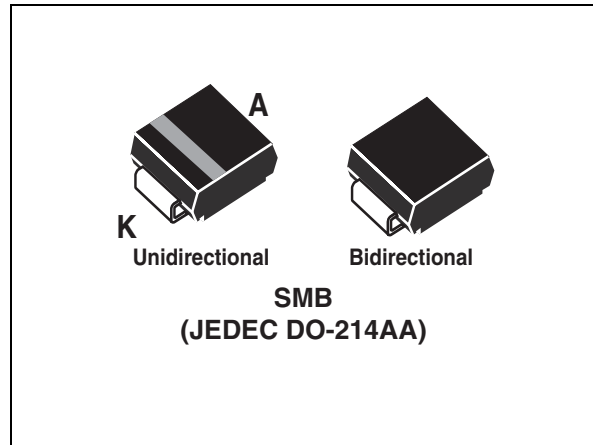
Features

- Peak pulse power: 600 W (10/1000 μ s)
- Stand off voltage range: from 5 V to 188 V
- Uni and bidirectional types
- Low clamping factor
- Fast response time
- JEDEC registered package outline

Description

The SMBJ series are TRANSIL™ diodes designed specifically for protecting sensitive equipment against transient overvoltages.

Transil diodes provide high overvoltage protection by clamping action. Their instantaneous response to transient overvoltages makes them particularly suited to protect voltage sensitive devices such as MOS Technology and low voltage supplied IC's.



Order code

| Part number | Marking |
|--------------|-------------------|
| SMBJxxxA-TR | See pages 2 and 3 |
| SMBJxxxCA-TR | See pages 2 and 3 |

Table 1. Absolute maximum ratings ($T_{amb} = 25^{\circ} C$)

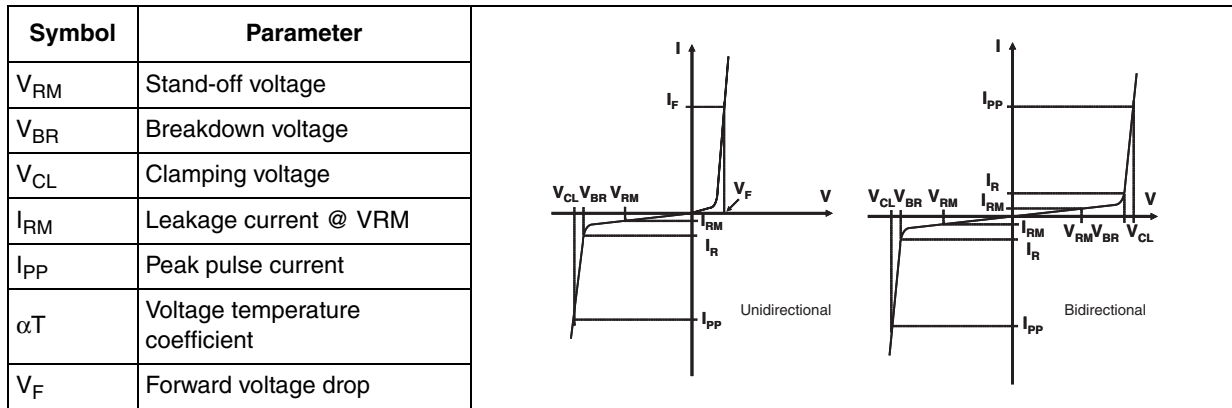
| Symbol | Parameter | | Value | Unit |
|-----------|--|--|-------------|--------------|
| P_{PP} | Peak pulse power dissipation ⁽¹⁾ | T_j initial = T_{amb} | 600 | W |
| P | Power dissipation on infinite heatsink | $T_{amb} = 50^{\circ} C$ | 5 | W |
| I_{FSM} | Non repetitive surge peak forward current for unidirectional types | $t_p = 10$ ms T_j initial = T_{amb} | 100 | A |
| T_{stg} | Storage temperature range | | -65 to +175 | $^{\circ} C$ |
| T_j | Maximum junction temperature | | 150 | $^{\circ} C$ |
| T_L | Maximum lead temperature for soldering during 10 s. | | 260 | $^{\circ} C$ |

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

Table 2. Thermal resistances

| Symbol | Parameter | Value | Unit |
|---------------|--|-------|----------------|
| $R_{th(j-l)}$ | Junction to leads | 20 | $^{\circ} C/W$ |
| $R_{th(j-a)}$ | Junction to ambient on printed circuit on recommended pad layout | 100 | $^{\circ} C/W$ |

1 Electrical characteristics (Tamb = 25° C)



| Types | | | | I_{RM} @ V_{RM} max. | | V_{BR} @ I_R min. (1) | | V_{CL} @ I_{PP} max. 10/1000 μs | | V_{CL} @ I_{PP} max. 8/20 μs | | αT max. (2) | C typ. (3) |
|----------------|------|---------------|------|--------------------------------|-----|------------------------------|----|--|------|---|-----|------------------------|------------------|
| | | | | μA | V | V | mA | V | A | V | A | | |
| Unidirectional | Mark | Bidirectional | Mark | | | | | | | | | 10-4/° C | pF |
| SMBJ5.0A-TR | BUZ | SMBJ5.0CA-TR | BBZ | 800 | 5.0 | 6.4 | 10 | 9.2 | 68 | 13.4 | 298 | 5.7 | 4000 |
| SMBJ6.0A-TR | BUA | SMBJ6.0CA-TR | BBA | 800 | 6.0 | 6.7 | 10 | 10.3 | 61 | 13.7 | 290 | 5.9 | 3850 |
| SMBJ6.5A-TR | BUB | SMBJ6.5CA-TR | BBB | 500 | 6.5 | 7.2 | 10 | 11.2 | 56 | 14.5 | 276 | 6.1 | 3700 |
| SMBJ8.5A-TR | BUC | SMBJ8.5CA-TR | BBC | 5 | 8.5 | 9.4 | 1 | 14.4 | 41.7 | 19.5 | 205 | 7.3 | 2800 |
| SMBJ10A-TR | BUD | SMBJ10CA-TR | BBD | 5 | 10 | 11.1 | 1 | 17 | 37 | 21.7 | 184 | 7.8 | 2300 |
| SMBJ12A-TR | BUE | SMBJ12CA-TR | BBE | 5 | 12 | 13.3 | 1 | 19.9 | 31 | 25.3 | 157 | 8.3 | 2025 |
| SMBJ13A-TR | BUF | SMBJ13CA-TR | BBF | 1 | 13 | 14.4 | 1 | 21.5 | 29 | 27.2 | 147 | 8.4 | 1900 |
| SMBJ15A-TR | BUG | SMBJ15CA-TR | BBG | 1 | 15 | 16.7 | 1 | 24.4 | 25.1 | 32.5 | 123 | 8.8 | 1600 |
| SMBJ16A-TR | CUG | SMBJ16CA-TR | CBG | 1 | 16 | 17.8 | 1 | 26 | 23.1 | 32.5 | 123 | 8.8 | 1600 |
| SMBJ18A-TR | BUH | SMBJ18CA-TR | BBH | 1 | 18 | 20 | 1 | 29.2 | 21.5 | 39.3 | 102 | 9.2 | 1350 |
| SMBJ20A-TR | BUI | SMBJ20CA-TR | BBI | 1 | 20 | 22.2 | 1 | 32.4 | 19.4 | 42.8 | 93 | 9.4 | 1250 |
| SMBJ22A-TR | BVA | SMBJ22CA-TR | CBH | 1 | 22 | 24.4 | 1 | 35.5 | 17.7 | 48.3 | 83 | 9.6 | 1150 |
| SMBJ24A-TR | BUJ | SMBJ24CA-TR | BBJ | 1 | 24 | 26.7 | 1 | 38.9 | 16 | 50 | 80 | 9.6 | 1112 |
| SMBJ26A-TR | BUK | SMBJ26CA-TR | BBK | 1 | 26 | 28.9 | 1 | 42.1 | 14.9 | 53.5 | 75 | 9.7 | 1075 |
| SMBJ28A-TR | BUL | SMBJ28CA-TR | BBL | 1 | 28 | 31.1 | 1 | 45.4 | 13.8 | 59 | 68 | 9.8 | 1000 |
| SMBJ30A-TR | BUM | SMBJ30CA-TR | BBM | 1 | 30 | 33.3 | 1 | 48.4 | 13 | 64.3 | 62 | 9.9 | 950 |
| SMBJ33A-TR | BUN | SMBJ33CA-TR | BBN | 1 | 33 | 36.7 | 1 | 53.3 | 11.8 | 69.7 | 57 | 10.0 | 900 |
| SMBJ36A-TR | CUN | SMBJ36CA-TR | BBN | 1 | 36 | 40.0 | 1 | 58.1 | 10.3 | 76 | 94 | 10.4 | 850 |
| SMBJ40A-TR | CUJ | SMBJ40CA-TR | CBJ | 1 | 40 | 44.4 | 1 | 64.5 | 9.7 | 84 | 48 | 10.1 | 800 |
| SMBJ48A-TR | BUW | SMBJ48CA-TR | BBW | 1 | 48 | 53.3 | 1 | 77.4 | 8.1 | 100 | 40 | 10.3 | 700 |
| SMBJ58A-TR | BUO | SMBJ58CA-TR | BBO | 1 | 58 | 64.4 | 1 | 93.6 | 6.7 | 121 | 33 | 10.4 | 625 |

| Types | | | | IRM @VRM max. | | VBR @IR min.(1) | | VCL @IPP max. 10/1000 µs | | VCL @IPP max. 8/20 µs | | αT max.(2) | C typ.(3) |
|-------------|-----|--------------|-----|---------------|-----|-----------------|---|--------------------------|-----|-----------------------|------|------------|-----------|
| | | | | 1 | 70 | 77.8 | 1 | 113 | 5.5 | 146 | 27 | | |
| SMBJ70A-TR | CUM | SMBJ70CA-TR | CBM | 1 | 70 | 77.8 | 1 | 113 | 5.5 | 146 | 27 | 10.5 | 550 |
| SMBJ85A-TR | BUQ | SMBJ85CA-TR | BBQ | 1 | 85 | 94.4 | 1 | 137 | 4.6 | 178 | 22.5 | 10.6 | 500 |
| SMBJ100A-TR | CUQ | SMBJ100CA-TR | CBQ | 1 | 100 | 111 | 1 | 162 | 3.8 | 212 | 19 | 10.7 | 450 |
| SMBJ130A-TR | BUS | SMBJ130CA-TR | BBS | 1 | 130 | 144 | 1 | 209 | 3 | 265 | 15 | 10.8 | 400 |
| SMBJ154A-TR | BUT | SMBJ154CA-TR | BBT | 1 | 154 | 171 | 1 | 246 | 2.4 | 317 | 12.6 | 10.8 | 360 |
| SMBJ170A-TR | BUU | SMBJ170CA-TR | BBU | 1 | 170 | 189 | 1 | 275 | 2.2 | 353 | 11.3 | 10.8 | 350 |
| SMBJ188A-TR | BUV | SMBJ188CA-TR | BBV | 1 | 188 | 209 | 1 | 328 | 2 | 388 | 10.3 | 10.8 | 330 |

1. Pulse test : tp < 50ms.
2. $V_{BR} = \alpha T * (T_{amb} - 25) * V_{BR}(25^{\circ} C)$.
3. $V_R = 0 V$, $F = 1 MHz$. For bidirectional types, capacitance value is divided by 2.

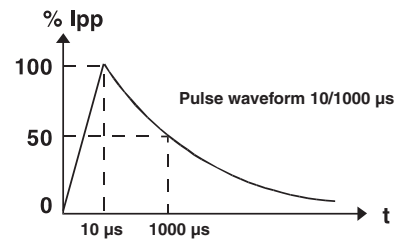


Figure 1. Peak pulse power dissipation versus initial junction temperature (printed circuit board).

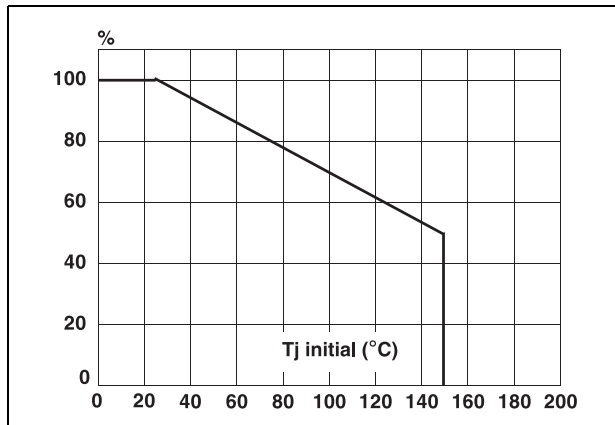


Figure 2. Peak pulse power versus exponential pulse duration.

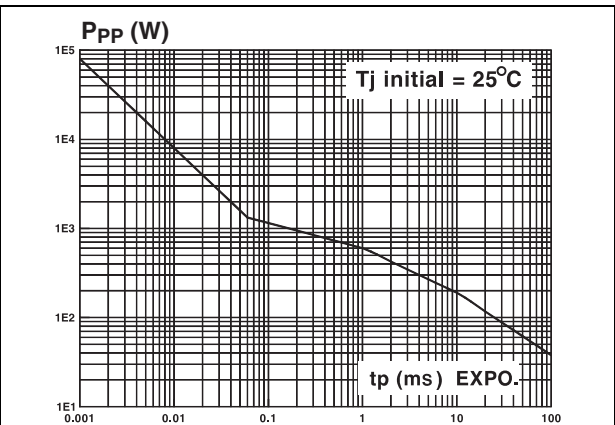
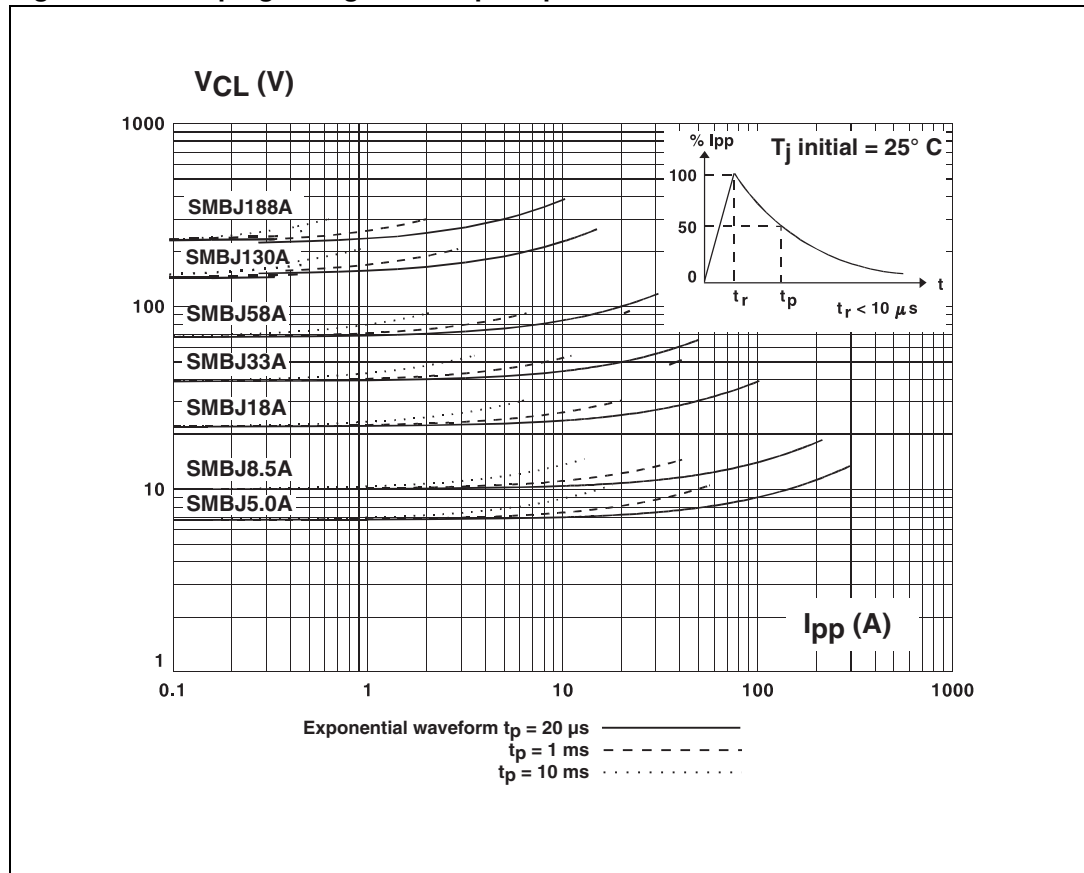


Figure 3. Clamping voltage versus peak pulse current.



Note: The curves of figure 3 are specified for a junction temperature of 25° C before surge. The given results may be extrapolated for other junction temperatures by using the following formula :

$$\Delta VBR = \alpha T * [T_{amb} - 25] * VBR(25° C)$$

For intermediate voltages, extrapolate the given results.

Figure 4. Capacitance versus reverse applied voltage for unidirectional types (typical values)

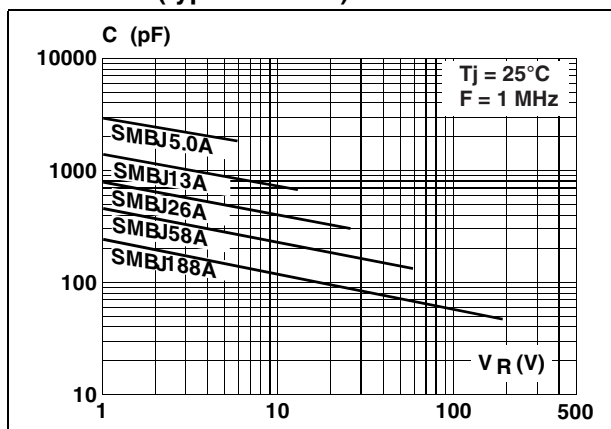


Figure 5. Capacitance versus reverse applied voltage for bidirectional types (typical values)

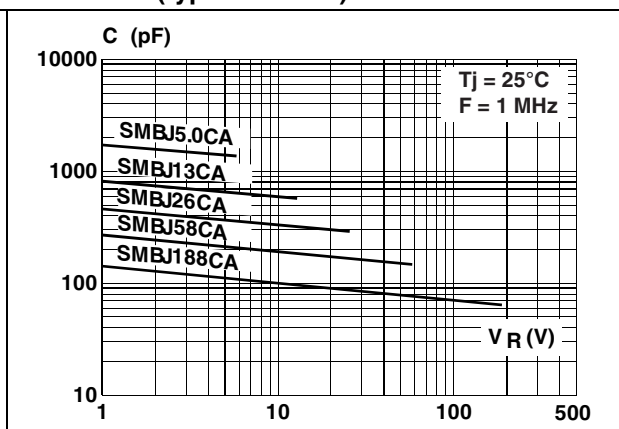


Figure 6. Peak forward voltage drop versus peak forward current (typical values for unidirectional types).

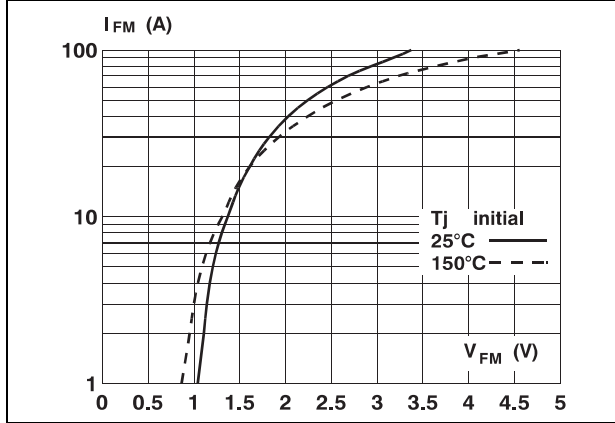


Figure 7. Transient thermal impedance junction-ambient versus pulse duration. Mounting on FR4 PC Board with Recommended pad layout.

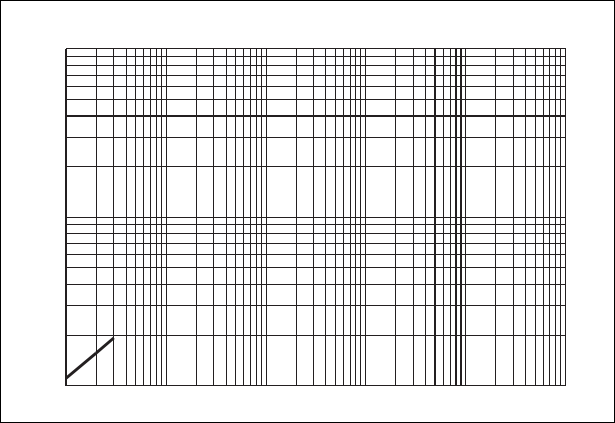
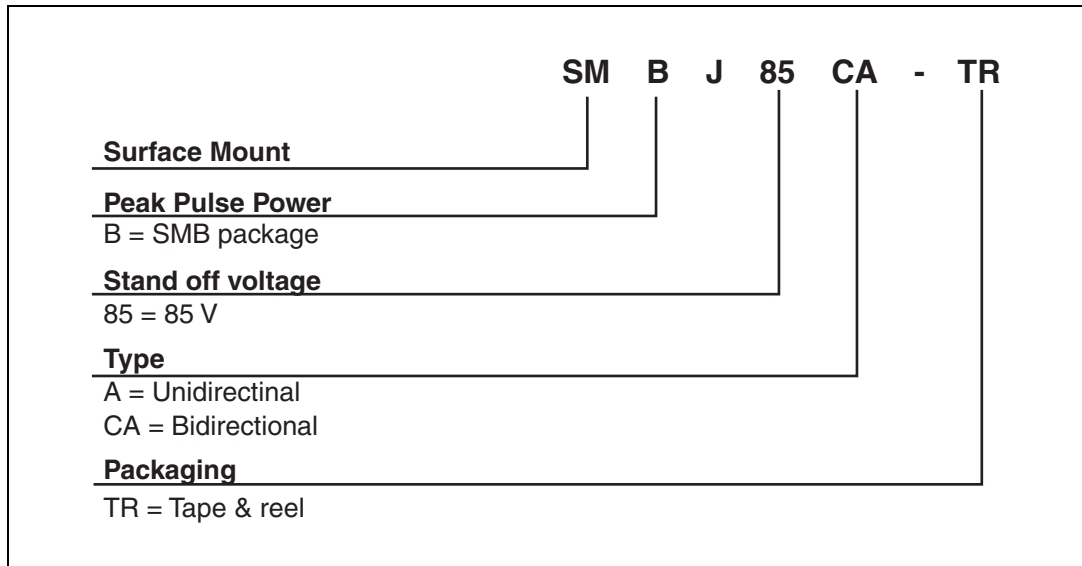


Figure 8. Relative variation of leakage current versus junction temperature.

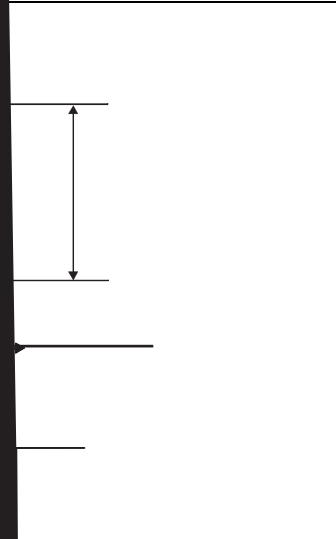


2 Order code



Package mechanical data SMB (plastic)

Dimensions



| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A1 | 1.90 | 2.15 | 2.45 | 0.075 | 0.085 | 0.096 |
| A2 | 0.05 | 0.15 | 0.20 | 0.002 | 0.006 | 0.008 |
| b | 1.95 | | 2.20 | 0.077 | | 0.087 |
| c | 0.15 | | 0.41 | 0.006 | | 0.016 |
| E | 5.10 | 5.40 | 5.60 | 0.201 | 0.213 | 0.220 |
| E1 | 4.05 | 4.30 | 4.60 | 0.159 | 0.169 | 0.181 |
| D | 3.30 | 3.60 | 3.95 | 0.130 | 0.142 | 0.156 |
| L | 0.75 | 1.15 | 1.60 | 0.030 | 0.045 | 0.063 |

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4 Ordering information

| Part number | Marking | Package | Weight | Base qty | Delivery mode |
|--------------|--------------------|---------|--------|----------|---------------|
| SMBJxxxA-TR | See pages 2 and 3. | SMB | 0.12 g | 5000 | Tape and reel |
| SMBJxxxCA-TR | See pages 2 and 3. | SMB | 0.12 g | 5000 | Tape and reel |

5 Revision history

Table 4. Document revision history

| Date | Revision | 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 on page 2. |

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