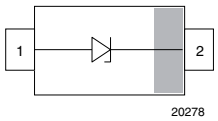
# Surface Mount ESD Protection Diodes



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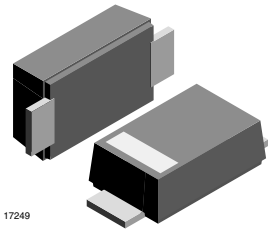
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## FEATURES

- For surface mounted applications
- Low-profile package
- Optimized for LAN protection applications
- Ideal for ESD protection of data lines in accordance with IEC 61000-4-2 (IEC 801-2)
- Ideal for EFT protection of data lines in accordance with IEC 61000-4-4 (IEC 801-4)
- ESD-protection acc. IEC 61000-4-2
  ± 30 kV contact discharge
  ± 30 kV air discharge
- Low incremental surge resistance, excellent clamping capability
- 200 W peak pulse power capability with a 10/1000 µs waveform, repetition rate (duty cycle): 0.01 %
- Very fast response time
- High temperature soldering guaranteed: 260 °C/10 s at terminals
- e3 - Sn
- AEC-Q101 qualified
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21 definiton

Pb e3 RoHS COMPLIANT HALOGEN FREE

## MARKING (example only)

20279

Bar = cathode marking
Y = type code (see table below)
X = date code

## ORDERING INFORMATION

SMF5V0A-M-xx
- GS08 = 3K per 7" reel (8 mm tape), 30K/box
- GS18 = 10K per 13" reel (8 mm tape), 50K/box
- Environmental suffix -M- defines halogen-free
- Part number

| PACKAGE DATA | | | | | | |
|---|---|---|---|---|---|---|
| DEVICE NAME | PACKAGE NAME | TYPE CODE | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL | SOLDERING CONDITIONS |
| SMF5V0A-M | SMF | NE | 15 mg | UL 94 V-0 | MSL level 1 (according J-STD-020) | 260 °C/10 s at terminals |
| SMF6V5A-M | | NK | | | | |
| SMF7V0A-M | | NM | | | | |
| SMF7V5A-M | | NP | | | | |
| SMF8V0A-M | | NR | | | | |
| SMF8V5A-M | | NT | | | | |
| SMF9V0A-M | | NV | | | | |
| SMF10A-M | | NX | | | | |
| SMF11A-M | | NZ | | | | |
| SMF12A-M | | OE | | | | |
| SMF13A-M | | OG | | | | |
| SMF14A-M | | OK | | | | |
| SMF15A-M | | OM | | | | |
| SMF16A-M | | OP | | | | |
| SMF17A-M | | OR | | | | |
| SMF18A-M | | OT | | | | |
| SMF20A-M | | OV | | | | |
| SMF22A-M | | OX | | | | |
| SMF24A-M | | OZ | | | | |

## PACKAGE DATA

| DEVICE NAME | PACKAGE NAME | TYPE CODE | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL | SOLDERING CONDITIONS |
|---|---|---|---|---|---|---|
| SMF26A-M | SMF | PE | 15 mg | UL 94 V-0 | MSL level 1 (according J-STD-020) | 260 °C/10 s at terminals |
| SMF28A-M | | PG | | | | |
| SMF30A-M | | PK | | | | |
| SMF33A-M | | PM | | | | |
| SMF36A-M | | PP | | | | |
| SMF40A-M | | PR | | | | |
| SMF43A-M | | PT | | | | |
| SMF45A-M | | PV | | | | |
| SMF48A-M | | PX | | | | |
| SMF51A-M | | PZ | | | | |

## ABSOLUTE MAXIMUM RATINGS ($T_{amb}$ = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITIONS | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|
| Peak pulse current | $t_p$ = 10/1000 µs waveform acc. IEC 61000-4-5 | $I_{PPM}$ | see "Electrical Characteristics" | A |
| Peak pulse power | $t_p$ = 10/1000 µs waveform acc. IEC 61000-4-5 | $P_{PP}$ | 200 | W |
| | $t_p$ = 8/20 µs waveform acc. IEC 61000-4-5 | | 1000 | W |
| Peak forward surge current | 8.3 ms single half sine-wave | $I_{FSM}$ | 20 | A |
| ESD immunity | Contact discharge acc. IEC 61000-4-2; 10 pulses | $V_{ESD}$ | ± 30 | kV |
| | Air discharge acc. IEC 61000-4-2; 10 pulses | | ± 30 | kV |
| Thermal resistance | Mounted on epoxy glass PCB with 3 mm x 3 mm, Cu pads ( ≥ 40 µm thick) | $R_{thJA}$ | 180 | K/W |
| Forward clamping voltage | $I_F$ = 12 A | $V_F$ | 3.5 | V |
| Operating temperature | Junction temperature | $T_J$ | - 55 to + 150 | °C |
| Storage temperature | | $T_{STG}$ | - 55 to + 150 | °C |

## ELECTRICAL CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified)

| PART NUMBER | REVERSE BREAKDOWN VOLTAGE at $I_T$, $t_p \leq 5$ ms | TEST CURRENT | REVERSE WORKING VOLTAGE | REVERSE CURRENT at $V_{RWM}$ | MAXIMUM PEAK PULSE CURRENT $t_p$ = 10/1000 s | REVERSE CLAMPING VOLTAGE at $I_{PPM}$ | CAPACITANCE at $V_R$ = 0 V, f = 1 MHz | PROTECTION PATHS |
|---|---|---|---|---|---|---|---|---|
| | $V_{BR}$ MIN. (V) | $I_T$ (mA) | $V_{RWM}$ (V) | $I_R$ ( A) | $I_{PPM}$ (A) | $V_C$ (V) | $C_D$ TYP. (pF) | $N_{channel}$ |
| SMF5V0A-M | 6.40 | 10 | 5 | 400 | 21.7 | 9.2 | 1030 | 1 |
| SMF6V0A-M | 6.67 | 10 | 6 | 400 | 19.4 | 10.3 | 1010 | 1 |
| SMF6V5A-M | 7.22 | 10 | 6.5 | 250 | 17.9 | 11.2 | 850 | 1 |
| SMF7V0A-M | 7.78 | 10 | 7 | 100 | 16.7 | 12 | 750 | 1 |
| SMF7V5A-M | 8.33 | 1 | 7.5 | 50 | 15.5 | 12.9 | 730 | 1 |
| SMF8V0A-M | 8.89 | 1 | 8 | 25 | 14.7 | 13.6 | 670 | 1 |
| SMF8V5A-M | 9.44 | 1 | 8.5 | 10 | 13.9 | 14.4 | 660 | 1 |
| SMF9V0A-M | 10 | 1 | 9 | 5 | 13.5 | 15.4 | 620 | 1 |
| SMF10A-M | 11.1 | 1 | 10 | 2.5 | 11.8 | 17 | 570 | 1 |
| SMF11A-M | 12.2 | 1 | 11 | 2.5 | 11 | 18.2 | 460 | 1 |
| SMF12A-M | 13.3 | 1 | 12 | 2.5 | 10.1 | 19.9 | 440 | 1 |
| SMF13A-M | 14.4 | 1 | 13 | 1 | 9.3 | 21.5 | 420 | 1 |
| SMF14A-M | 15.6 | 1 | 14 | 1 | 8.6 | 23.2 | 370 | 1 |
| SMF15A-M | 16.7 | 1 | 15 | 1 | 8.2 | 24.4 | 350 | 1 |
| SMF16A-M | 17.8 | 1 | 16 | 1 | 7.7 | 26 | 340 | 1 |
| SMF17A-M | 18.9 | 1 | 17 | 1 | 7.2 | 27.6 | 310 | 1 |

| ELECTRICAL CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PART NUMBER | REVERSE BREAKDOWN VOLTAGE at $I_T$, $t_p \leq 5$ ms | TEST CURRENT | REVERSE WORKING VOLTAGE | REVERSE CURRENT at $V_{RWM}$ | MAXIMUM PEAK PULSE CURRENT $t_p$ = 10/1000 s | REVERSE CLAMPING VOLTAGE at $I_{PPM}$ | CAPACITANCE at $V_R$ = 0 V, f = 1 MHz | PROTECTION PATHS |
| | $V_{BR}$ MIN. (V) | $I_T$ (mA) | $V_{RWM}$ (V) | $I_R$ ( A) | $I_{PPM}$ (A) | $V_C$ (V) | $C_D$ TYP. (pF) | $N_{channel}$ |
| SMF18A-M | 20 | 1 | 18 | 1 | 5.8 | 29.2 | 305 | 1 |
| SMF20A-M | 22.2 | 1 | 20 | 1 | 6.2 | 32.4 | 207 | 1 |
| SMF22A-M | 24.4 | 1 | 22 | 1 | 5.6 | 35.5 | 265 | 1 |
| SMF24A-M | 26.7 | 1 | 24 | 1 | 5.1 | 38.9 | 240 | 1 |
| SMF26A-M | 28.9 | 1 | 26 | 1 | 4.8 | 42.1 | 225 | 1 |
| SMF28A-M | 31.1 | 1 | 28 | 1 | 4.4 | 45.4 | 210 | 1 |
| SMF30A-M | 33.3 | 1 | 30 | 1 | 4.1 | 48.4 | 205 | 1 |
| SMF33A-M | 36.7 | 1 | 33 | 1 | 3.8 | 53.3 | 190 | 1 |
| SMF36A-M | 40 | 1 | 36 | 1 | 3.4 | 58.1 | 180 | 1 |
| SMF40A-M | 44.4 | 1 | 40 | 1 | 3.1 | 64.5 | 165 | 1 |
| SMF43A-M | 47.8 | 1 | 43 | 1 | 2.9 | 69.4 | 160 | 1 |
| SMF45A-M | 50 | 1 | 45 | 1 | 2.8 | 72.7 | 155 | 1 |
| SMF48A-M | 53.3 | 1 | 48 | 1 | 2.6 | 77.4 | 150 | 1 |
| SMF51A-M | 56.7 | 1 | 51 | 1 | 2.4 | 82.4 | 145 | 1 |

## TYPICAL CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified)

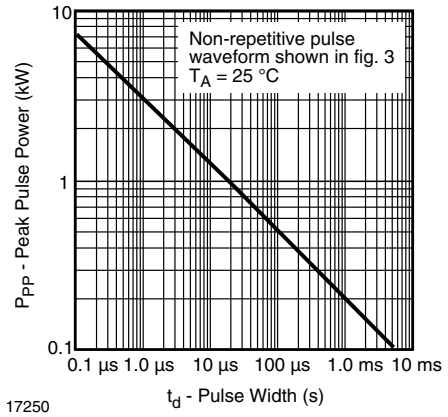



Fig. 1 - Peak Pulse Power Rating

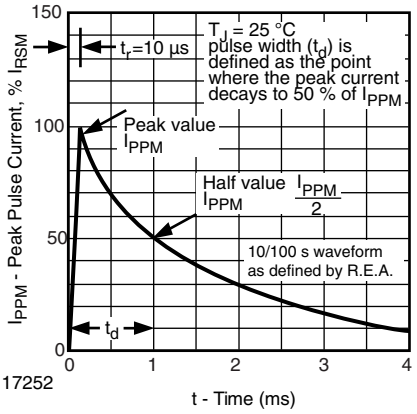



Fig. 3 - Pulse Waveform

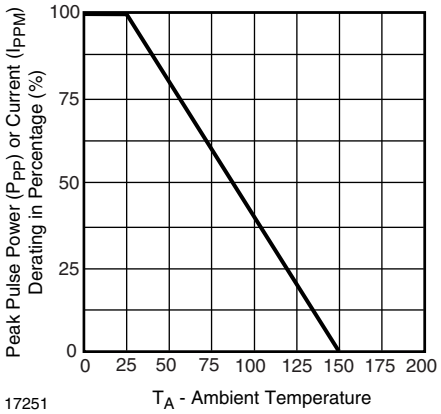
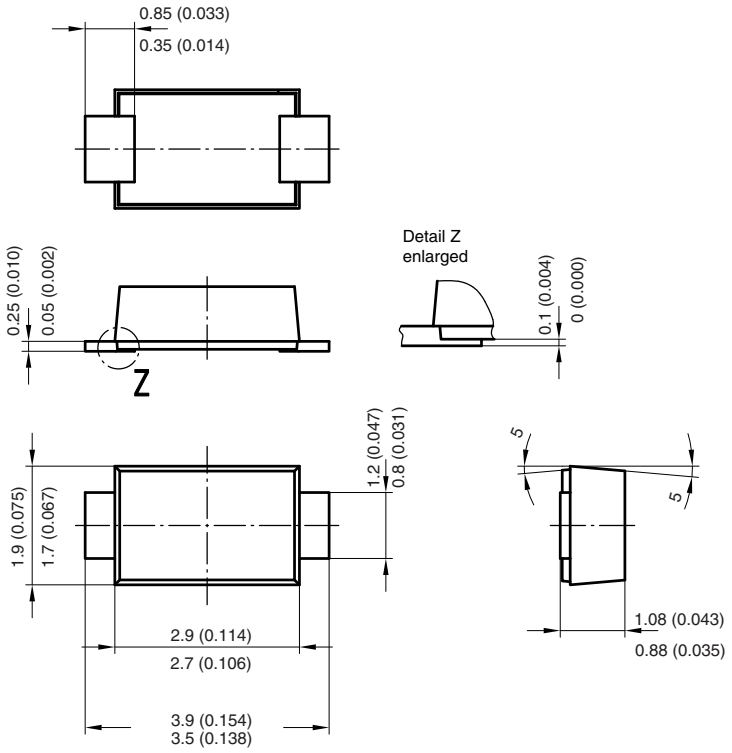
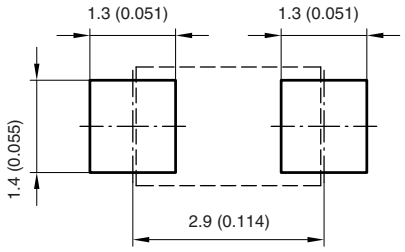



Fig. 2 - Pulse Derating Curve

## **PACKAGE DIMENSIONS** in millimeters (inches): **SMF**




Foot print recommendation:

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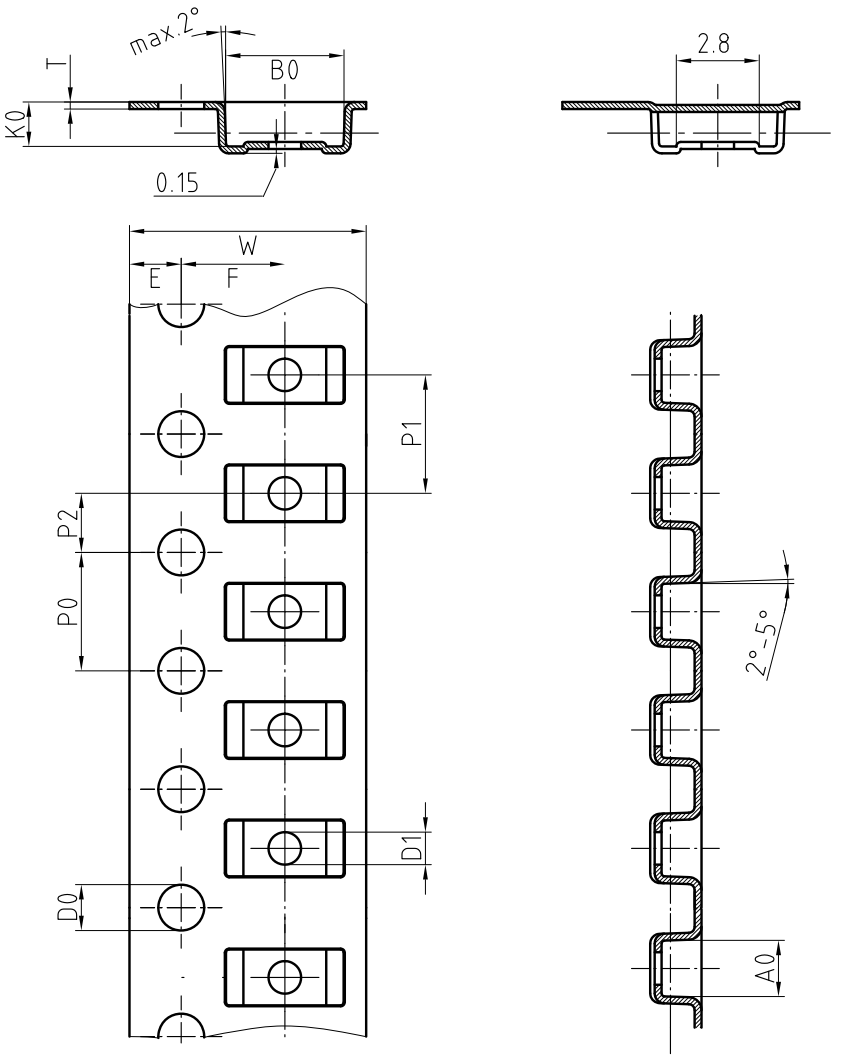
**BLISTERTAPE DIMENSIONS** in millimeters (inches)




| Mat: | A0 | B0 | K0 | W | T | P0 | P2 | P1 | D0 | D1 | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PS | 1.9 | 4.0 | 1.5 | 8.0 | 0.235 | 4.0 | 2.0 | 4.0 | 1.5 | 1 | 1.75 | 3.5 |

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