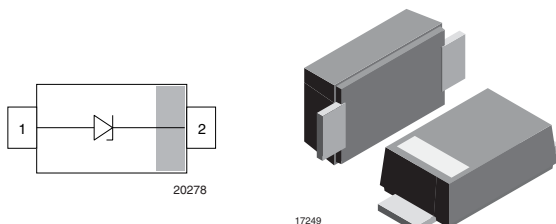
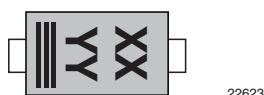




## Surface Mount ESD Protection Diodes



## MARKING (example only)



Bar = cathode marking

YY = type code (see table below)

XX = date code

## 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  $\mu$ s 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 definition



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## ORDERING INFORMATION

SMF5V0A-M-xx

08 = 3K per 7" reel (8 mm tape), 30K/box  
18 = 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<br>(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<br>(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 ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)

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

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

| PART NUMBER | REVERSE BREAKDOWN VOLTAGE at $I_T$ , $t_p \leq 5\text{ ms}$ | TEST CURRENT      | REVERSE WORKING VOLTAGE | REVERSE CURRENT at $V_{RWM}$ | MAXIMUM PEAK PULSE CURRENT $t_p = 10/1000\text{ }\mu\text{s}$ | REVERSE CLAMPING VOLTAGE at $I_{PPM}$ | CAPACITANCE at $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ | PROTECTION PATHS |
|-------------|-------------------------------------------------------------|-------------------|-------------------------|------------------------------|---------------------------------------------------------------|---------------------------------------|--------------------------------------------------------|------------------|
|             | $V_{BR}\text{ MIN. (V)}$                                    | $I_T\text{ (mA)}$ | $V_{RWM}\text{ (V)}$    | $I_R\text{ (}\mu\text{A)}$   | $I_{PPM}\text{ (A)}$                                          | $V_C\text{ (V)}$                      | $C_D\text{ TYP. (pF)}$                                 | $N_{channel}$    |
| 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                |
| SMF18A-M    | 20                                                          | 1                 | 18                      | 1                            | 5.8                                                           | 29.2                                  | 305                                                    | 1                |

**ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PART NUMBER | REVERSE BREAKDOWN VOLTAGE<br>at $I_T$ , $t_p \leq 5\text{ ms}$ | TEST CURRENT      | REVERSE WORKING VOLTAGE | REVERSE CURRENT<br>at $V_{RWM}$ | MAXIMUM PEAK PULSE CURRENT<br>$t_p = 10/1000\text{ }\mu\text{s}$ | REVERSE CLAMPING VOLTAGE<br>at $I_{PPM}$ | CAPACITANCE<br>at $V_R = 0\text{ V}$ ,<br>$f = 1\text{ MHz}$ | PROTECTION PATHS |
|-------------|----------------------------------------------------------------|-------------------|-------------------------|---------------------------------|------------------------------------------------------------------|------------------------------------------|--------------------------------------------------------------|------------------|
|             | $V_{BR}\text{ MIN. (V)}$                                       | $I_T\text{ (mA)}$ | $V_{RWM}\text{ (V)}$    | $I_R\text{ (}\mu\text{A)}$      | $I_{PPM}\text{ (A)}$                                             | $V_C\text{ (V)}$                         | $C_D\text{ TYP. (pF)}$                                       | $N_{channel}$    |
| 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                |

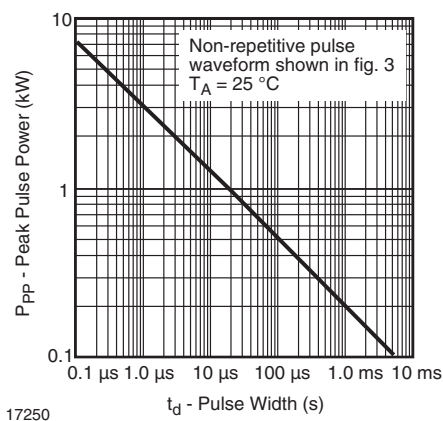
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

Fig. 1 - Peak Pulse Power Rating

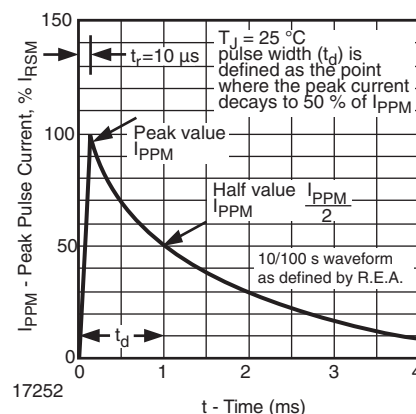


Fig. 3 - Pulse Waveform

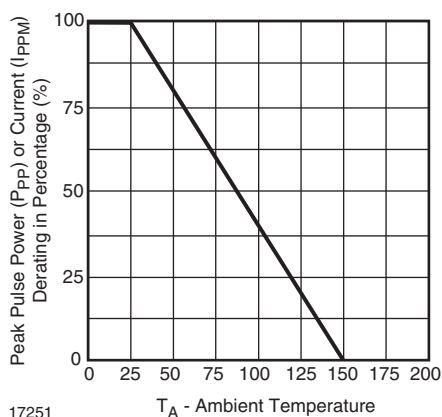
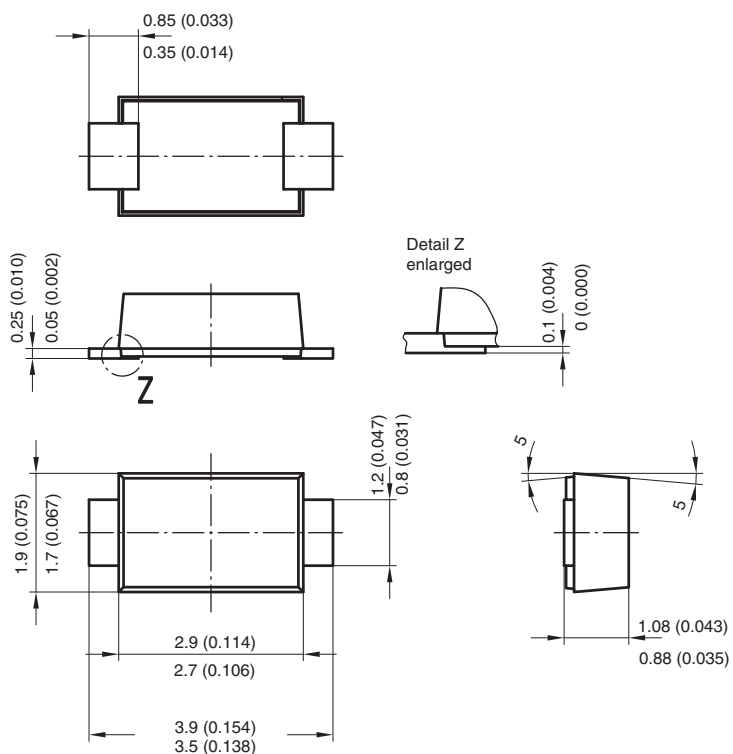


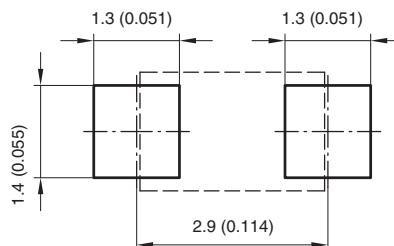
Fig. 2 - Pulse Derating Curve



## PACKAGE DIMENSIONS in millimeters (inches): SMF



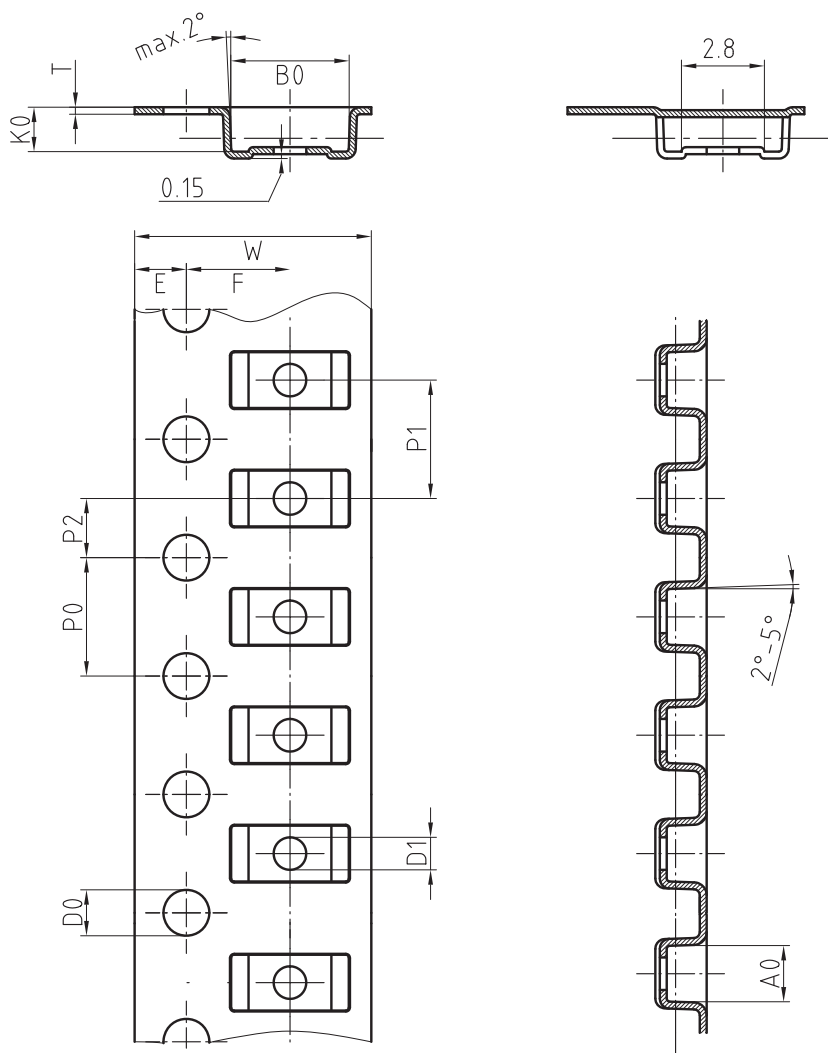
Foot print recommendation:



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Rev. 3 - Date: 13. March 2007  
Document no.: S8-V-3915.01-001 (4)  
17247



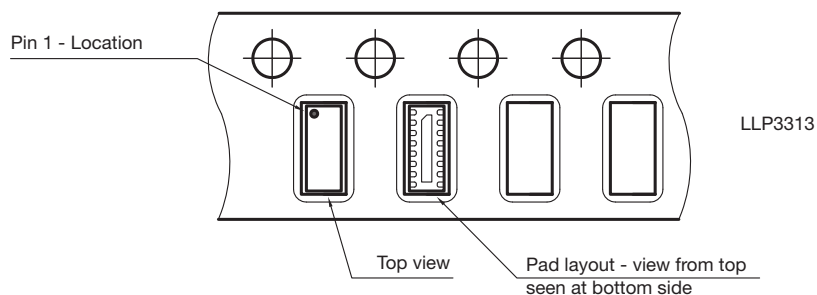
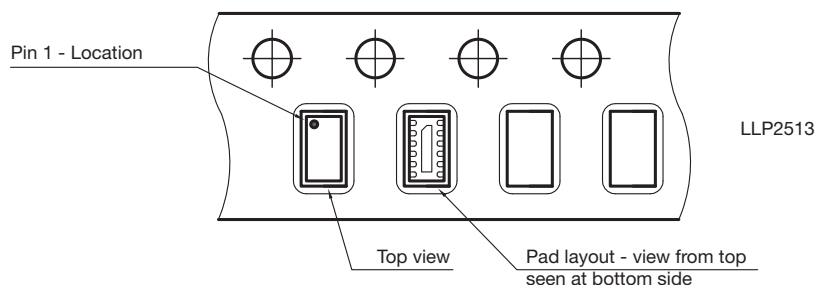
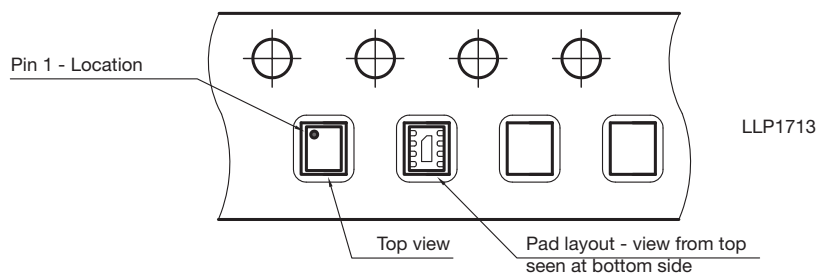
## BLISTERTAPE DIMENSIONS in millimeters (inches)



| 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 |

Document-No.: S8-V-3717.02-001 (3)

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