



**THE DATASHEET OF
SMPC78AN-M3/I**





Surface Mount TRANSZORB® Transient Voltage Suppressors

eSMP® Series



SMPC (TO-277A)



LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS | |
|-------------------------------|-----------------|
| V_{BR} unidirectional | 6.40 V to 104 V |
| V_{WM} | 5.0 V to 85 V |
| P_{PPM} | 1500 W |
| P_D at $T_A = 25\text{ °C}$ | 1.25 W |
| T_J max. | 150 °C |
| Polarity | Unidirectional |
| Package | SMPC (TO-277A) |

Note

- All electrical characteristics are only applicable when two identical polarity terminals are connected

FEATURES

- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Unidirection
- Excellent clamping capability
- Low incremental surge resistance
- Very fast response time
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available
- Automotive ordering code: base P/NHM3
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial and telecommunication. Sensitive equipment against transient overvoltages.

MECHANICAL DATA

Case: SMPC (TO-277A)

Molding compound meets UL 94 V-0 flammability rating
Base P/N-M3 - halogen-free, RoHS-compliant, and industrial grade

Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

M3 and HM3 suffix meet JESD 201 class 2 whisker test

Polarity: the band denotes cathode end

| MAXIMUM RATINGS ($T_A = 25\text{ °C}$ unless otherwise noted) | | | |
|---|-----------------|----------------|------|
| PARAMETER | SYMBOL | VALUE | UNIT |
| Peak power dissipation with a 10/1000 μ s waveform (fig. 3) | $P_{PPM}^{(1)}$ | 1500 | W |
| Peak pulse current with a 10/1000 μ s waveform (fig. 1) | $I_{PPM}^{(1)}$ | See next table | A |
| Power dissipation, $T_A = 25\text{ °C}$ | $P_D^{(2)}$ | 1.25 | W |
| Operating junction and storage temperature range | T_J, T_{STG} | -55 to +150 | °C |

Note

- (1) Non-repetitive current pulse, per fig. 3 and derated above $T_A = 25\text{ °C}$ per fig. 2
(2) Power dissipation mounted on FR4 PCB, 2 oz. standard footprint



SMPC5.0A thru SMPC36A, SMPC22AN thru SMPC85AN

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| ELECTRICAL CHARACTERISTICS (T _A = 25 °C unless otherwise noted) | | | | | | | | | | |
|--|---------------------|---------------------|-----------|--|------|----------------------------------|---------------------------------------|--|--|---|
| DEVICE TYPE | | DEVICE MARKING CODE | | BREAKDOWN VOLTAGE V _{BR} AT I _T ⁽¹⁾ (V) | | TEST CURRENT I _T (mA) | STAND-OFF VOLTAGE V _{WM} (V) | MAXIMUM REVERSE LEAKAGE CURRENT I _R AT V _{WM} (μA) | MAXIMUM PEAK PULSE SURGE CURRENT I _{PPM} ⁽²⁾ (A) | MAXIMUM CLAMPING VOLTAGE AT I _{PPM} V _C (V) |
| ANODE ON HEATSINK | CATHODE ON HEATSINK | SUFFIX A | SUFFIX AN | MIN. | MAX. | | | | | |
| SMPC5.0A | - | GDE | - | 6.40 | 7.07 | 10 | 5.0 | 1500 | 150.0 | 10.0 |
| SMPC6.0A | - | GDG | - | 6.67 | 7.37 | 10 | 6.0 | 1000 | 145.6 | 10.3 |
| SMPC6.5A | - | GDK | - | 7.22 | 7.98 | 10 | 6.5 | 500 | 133.9 | 11.2 |
| SMPC7.0A | - | GDM | - | 7.78 | 8.60 | 10 | 7.0 | 200 | 125.0 | 12.0 |
| SMPC7.5A | - | GDP | - | 8.33 | 9.21 | 1.0 | 7.5 | 100 | 116.3 | 12.9 |
| SMPC8.0A | - | GDR | - | 8.89 | 9.83 | 1.0 | 8.0 | 50 | 110.3 | 13.6 |
| SMPC8.5A | - | GDT | - | 9.44 | 10.4 | 1.0 | 8.5 | 20 | 104.2 | 14.4 |
| SMPC9.0A | - | GDV | - | 10.0 | 11.1 | 1.0 | 9.0 | 5.0 | 97.4 | 15.4 |
| SMPC10A | - | GDY | - | 11.1 | 12.3 | 1.0 | 10.0 | 2.0 | 88.2 | 17.0 |
| SMPC11A | - | GDZ | - | 12.2 | 13.5 | 1.0 | 11.0 | 2.0 | 82.4 | 18.2 |
| SMPC12A | - | GEE | - | 13.3 | 14.7 | 1.0 | 12.0 | 2.0 | 75.4 | 19.9 |
| SMPC13A | - | GEG | - | 14.4 | 15.9 | 1.0 | 13.0 | 1.0 | 69.8 | 21.5 |
| SMPC14A | - | GEK | - | 15.6 | 17.2 | 1.0 | 14.0 | 1.0 | 64.7 | 23.2 |
| SMPC15A | - | GEM | - | 16.7 | 18.5 | 1.0 | 15.0 | 1.0 | 61.5 | 24.4 |
| SMPC16A | - | GEP | - | 17.8 | 19.7 | 1.0 | 16.0 | 1.0 | 57.7 | 26.0 |
| SMPC17A | - | GER | - | 18.9 | 20.9 | 1.0 | 17.0 | 1.0 | 54.3 | 27.6 |
| SMPC18A | - | GET | - | 20.0 | 22.1 | 1.0 | 18.0 | 1.0 | 51.4 | 29.2 |
| SMPC20A | - | GEV | - | 22.2 | 24.5 | 1.0 | 20.0 | 1.0 | 46.3 | 32.4 |
| SMPC22A | SMPC22AN | GEX | PAV | 24.4 | 26.9 | 1.0 | 22.0 | 1.0 | 42.3 | 35.5 |
| SMPC24A | SMPC24AN | GEZ | PAW | 26.7 | 29.5 | 1.0 | 24.0 | 1.0 | 38.6 | 38.9 |
| SMPC26A | SMPC26AN | GFE | PAX | 28.9 | 31.9 | 1.0 | 26.0 | 1.0 | 35.6 | 42.1 |
| SMPC28A | SMPC28AN | GFG | PAY | 31.1 | 34.4 | 1.0 | 28.0 | 1.0 | 33.0 | 45.4 |
| SMPC30A | SMPC30AN | GFK | PAZ | 33.3 | 36.8 | 1.0 | 30.0 | 1.0 | 31.0 | 48.4 |
| SMPC33A | SMPC33AN | GFM | PBA | 36.7 | 40.6 | 1.0 | 33.0 | 1.0 | 28.1 | 53.3 |
| SMPC36A | SMPC36AN | GFP | PBB | 40.0 | 44.2 | 1.0 | 36.0 | 1.0 | 25.8 | 58.1 |
| - | SMPC40AN | - | PBC | 44.4 | 49.1 | 1.0 | 40.0 | 1.0 | 23.3 | 64.5 |
| - | SMPC43AN | - | PBD | 47.8 | 52.8 | 1.0 | 43.0 | 1.0 | 21.6 | 69.4 |
| - | SMPC45AN | - | PBE | 50.0 | 55.3 | 1.0 | 45.0 | 1.0 | 20.6 | 72.7 |
| - | SMPC48AN | - | PBF | 53.3 | 58.9 | 1.0 | 48.0 | 1.0 | 19.4 | 77.4 |
| - | SMPC51AN | - | PBG | 56.7 | 62.7 | 1.0 | 51.0 | 1.0 | 18.2 | 82.4 |
| - | SMPC54AN | - | PBH | 60.0 | 66.3 | 1.0 | 54.0 | 1.0 | 17.2 | 87.1 |
| - | SMPC58AN | - | PBK | 64.4 | 71.2 | 1.0 | 58.0 | 1.0 | 16.0 | 93.6 |
| - | SMPC60AN | - | PBL | 66.7 | 73.7 | 1.0 | 60.0 | 1.0 | 15.5 | 96.8 |
| - | SMPC64AN | - | PBM | 71.1 | 78.6 | 1.0 | 64.0 | 1.0 | 14.6 | 103 |
| - | SMPC70AN | - | PBN | 77.8 | 86.0 | 1.0 | 70.0 | 1.0 | 13.3 | 113 |
| - | SMPC75AN | - | PBP | 83.3 | 92.1 | 1.0 | 75.0 | 1.0 | 12.4 | 121 |
| - | SMPC78AN | - | PBQ | 86.7 | 95.8 | 1.0 | 78.0 | 1.0 | 11.9 | 126 |
| - | SMPC85AN | - | PBR | 94.4 | 104 | 1.0 | 85.0 | 1.0 | 10.9 | 137 |

Notes

- (1) Pulse test: t ≤ 50 ms
- (2) Surge current waveform per fig. 3 and derated per fig. 2
- (3) All terms and symbols are consistent with ANSI/IEEE C62.35



SMPC5.0A thru SMPC36A, SMPC22AN thru SMPC85AN

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| THERMAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | |
|---|--------------------------------|------|------|--------------------|
| PARAMETER | SYMBOL | TYP. | MAX. | UNIT |
| Typical thermal resistance | $R_{\theta JA}$ ⁽¹⁾ | 85 | 100 | $^\circ\text{C/W}$ |
| | $R_{\theta JM}$ ⁽²⁾ | 2.5 | 3 | |

Notes

- (1) Thermal resistance junction-to-ambient to follow JEDEC[®] 51-2A, device mounted on FR4 PCB, 2 oz. standard footprint
- (2) Thermal resistance junction-to-mount to follow JEDEC[®] 51-14 using Transient Dual Interface Test Method (TDIM)

| ORDERING INFORMATION (Example) | | | | |
|---------------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| SMPC5.0A-M3/86A ⁽¹⁾ | 0.10 | 86A | 1500 | 7" diameter plastic tape and reel |
| SMPC5.0A-M3/87A ⁽¹⁾ | 0.10 | 87A | 6500 | 13" diameter plastic tape and reel |
| SMPC22AN-M3/H | 0.10 | H | 1500 | 7" diameter plastic tape and reel |
| SMPC22AN-M3/I | 0.10 | I | 6500 | 13" diameter plastic tape and reel |
| SMPC22ANHM3/H ⁽²⁾ | 0.10 | H | 1500 | 7" diameter plastic tape and reel |
| SMPC22ANHM3/I ⁽²⁾ | 0.10 | I | 6500 | 13" diameter plastic tape and reel |

Notes

- (1) Package code /86A and /87A are available for SMPC5.0A-M3 to SMPC36A-M3
- (2) AEC-Q101 qualified, is available for SMPC22AN to SMPC85AN only



RATINGS AND CHARACTERISTICS CURVES ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)



Fig. 1 - Peak Pulse Power Rating Curve

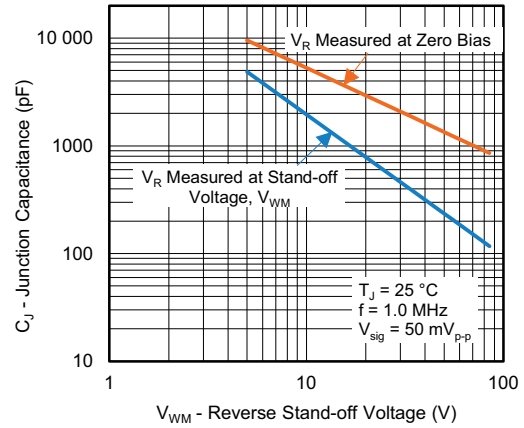


Fig. 3 - Typical Junction Capacitance



Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature



Fig. 4 - Steady State Power Dissipation

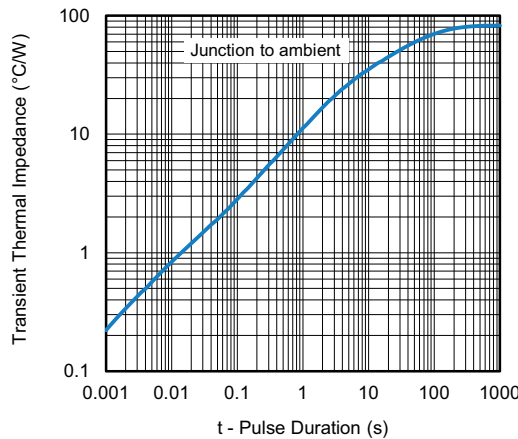


Fig. 5 - Typical Transient Thermal Impedance

Note

- Fig. 1 - Power calculation is based on I_{PPM} times defined maximum clamping voltage by pulse width
 Fig. 1 - 10 000 μs P_{PPM} is actual tested for $V_{WM} \leq 60\text{ V}$ types, over 60 V types 10 000 μs P_{PPM} is curve extensional value



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PACKAGE OUTLINE DIMENSIONS in inches (millimeters)



Conform to JEDEC® TO-277A

Note

(1) Cathode band orientation depends on device actual polarity direction



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