

High Current Density Surface-Mount Ultrafast Rectifiers

eSMP® Series



SMP (DO-220AA)

Cathode  Anode

FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Glass passivated pellet chip junction
- Ultrafast recovery times for high frequency
- Low forward voltage drop, low power losses
- Low thermal resistance
- Meets MSL level 1 per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

**AUTOMOTIVE
GRADE**
Available



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

LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS

| | |
|-----------------------|---------------------|
| $I_{F(AV)}$ | 2.0 A |
| V_{RRM} | 100 V, 150 V, 200 V |
| I_{FSM} | 50 A |
| t_{rr} | 25 ns |
| V_F at $I_F = 2$ A | 0.75 V |
| T_J max. | 175 °C |
| Package | SMP (DO-220AA) |
| Circuit configuration | Single |

TYPICAL APPLICATIONS

For use in secondary rectification and freewheeling for ultrafast switching speeds of AC/DC and DC/DC converters in high temperature for both consumer and automotive applications.

MECHANICAL DATA

Case: SMP (DO-220AA)

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

Base P/NHM3 - halogen-free, RoHS-compliant, and automotive grade

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

M3 suffix meets JESD 201 class 2 whisker test, HM3 suffix meets JESD 201 class 2 whisker test

Polarity: color band denotes the cathode end

MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted)

| PARAMETER | SYMBOL | ESH2PB | ESH2PC | ESH2PD | UNIT |
|---|----------------|-------------|--------|--------|------|
| Device marking code | | P2B | P2C | P2D | |
| Maximum repetitive peak reverse voltage | V_{RRM} | 100 | 150 | 200 | V |
| Maximum average forward rectified current (fig. 1) | $I_{F(AV)}$ | 2.0 | | | A |
| Peak forward surge current 10 ms single half sine-wave superimposed on rated load | I_{FSM} | 50 | | | A |
| Operating junction and storage temperature range | T_J, T_{STG} | -55 to +175 | | | °C |



| ELECTRICAL CHARACTERISTICS (T _A = 25 °C unless otherwise noted) | | | | | | |
|--|--|-------------------------|-------------------------------|------|------|------|
| PARAMETER | TEST CONDITIONS | | SYMBOL | TYP. | MAX. | UNIT |
| Maximum instantaneous forward voltage | I _F = 2 A | T _J = 25 °C | V _F ⁽¹⁾ | 0.90 | 0.98 | V |
| | | T _J = 125 °C | | 0.75 | 0.82 | |
| Maximum reverse current at rated V _R | | T _J = 25 °C | I _R ⁽²⁾ | 0.2 | 1.0 | μA |
| | | T _J = 125 °C | | 12.6 | 25 | |
| Maximum reverse recovery time | I _F = 0.5 A, I _R = 1 A, I _{rr} = 0.25 A | | t _{rr} | - | 25 | ns |
| Typical reverse recovery time | I _F = 1.0 A, V _R = 30 V, dI/dt = 50 A/μs, I _{rr} = 10 % I _{RM} | T _J = 25 °C | t _{rr} | 25 | - | ns |
| | | T _J = 100 °C | | 35 | - | |
| Typical stored charge | I _F = 1.0 A, V _R = 30 V, dI/dt = 50 A/μs, I _{rr} = 10 % I _{RM} | T _J = 25 °C | Q _{rr} | 10 | - | nC |
| | | T _J = 100 °C | | 15 | - | |
| Typical junction capacitance | 4.0 V, 1 MHz | | C _J | 25 | - | pF |

Notes(1) Pulse test: 300 μs pulse width, 1 % duty cycle(2) Pulse test: Pulse width $\leq 40\text{ ms}$

| THERMAL CHARACTERISTICS (T _A = 25 °C unless otherwise noted) | | | | | |
|---|---------------------------------|--------|--------|--------|------|
| PARAMETER | SYMBOL | ESH2PB | ESH2PC | ESH2PD | UNIT |
| Typical thermal resistance | R _{θJA} ⁽¹⁾ | 80 | | | °C/W |
| | R _{θJL} ⁽¹⁾ | 15 | | | |
| | R _{θJC} ⁽¹⁾ | 22 | | | |

Note(1) Thermal resistance from junction to ambient and junction to lead mounted on PCB with 6.0 mm x 6.0 mm copper pad areas. $R_{\theta JL}$ is measured at the terminal of cathode band. $R_{\theta JC}$ is measured at the top center of the body

| ORDERING INFORMATION (Example) | | | | |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| ESH2PB-M3/84A | 0.024 | 84A | 3000 | 7" diameter plastic tape and reel |
| ESH2PB-M3/85A | 0.024 | 85A | 10 000 | 13" diameter plastic tape and reel |
| ESH2PBHM3/84A ⁽¹⁾ | 0.024 | 84A | 3000 | 7" diameter plastic tape and reel |
| ESH2PBHM3/85A ⁽¹⁾ | 0.024 | 85A | 10 000 | 13" diameter plastic tape and reel |

Note

(1) Automotive grade



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

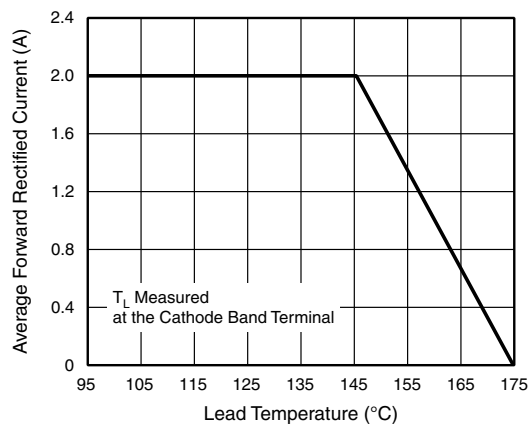


Fig. 1 - Maximum Forward Current Derating Curve

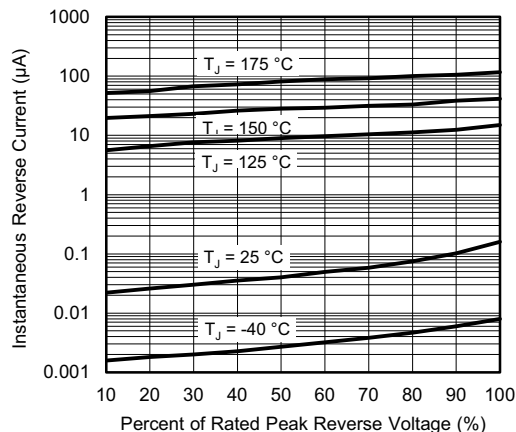


Fig. 4 - Typical Reverse Leakage Characteristics

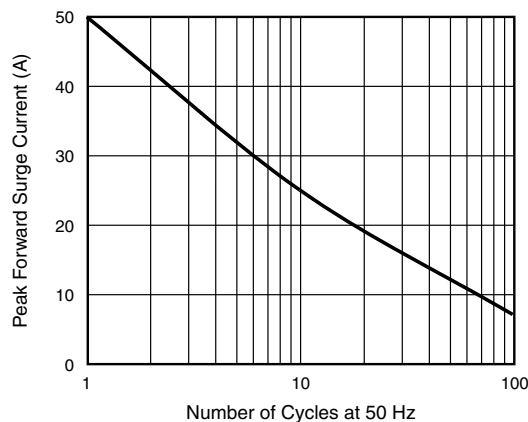


Fig. 2 - Maximum Non-Repetitive Peak Forward Surge Current

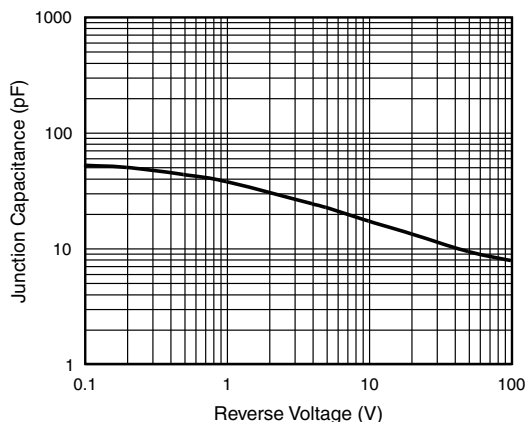


Fig. 5 - Typical Junction Capacitance

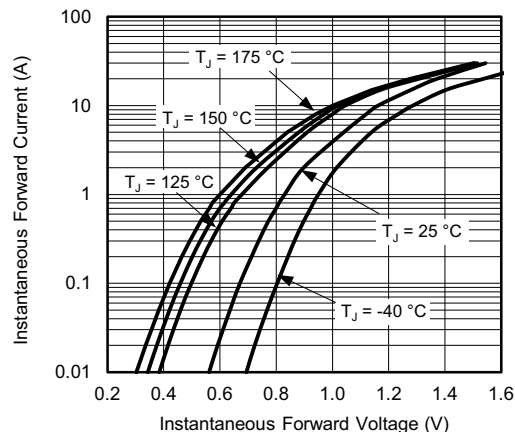
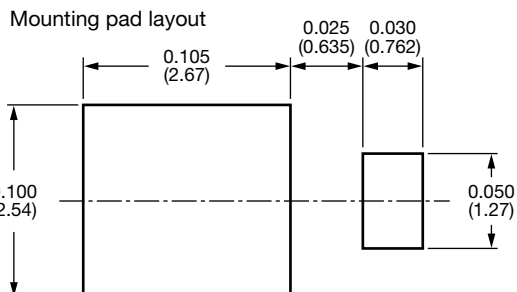
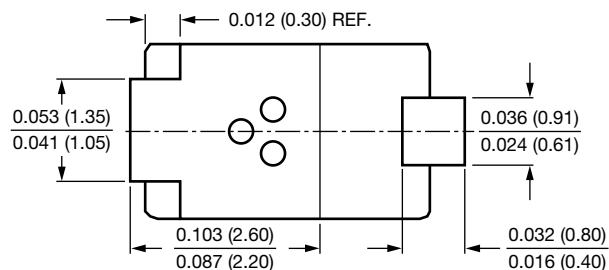
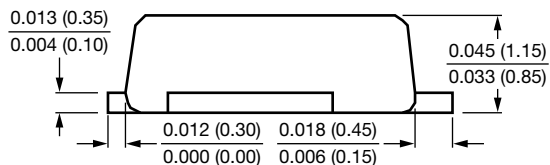
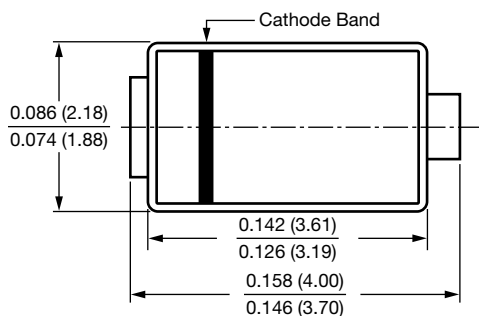


Fig. 3 - Typical Instantaneous Forward Characteristics



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMP (DO-220AA)





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