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www.vishay.com

ESH1PB, ESH1PC, ESH1PD

Vishay General Semiconductor

High Current Density Surface Mount Ultrafast Rectifiers

eSMP® Series



DO-220AA (SMP)



RoHS
COMPLIANT
HALOGEN
FREE

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 loss
- 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

TYPICAL APPLICATIONS

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

MECHANICAL DATA

Case: DO-220AA (SMP)

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 cathode end

| PRIMARY CHARACTERISTICS | |
|-------------------------|---------------------|
| $I_{F(AV)}$ | 1.0 A |
| V_{RRM} | 100 V, 150 V, 200 V |
| t_{rr} | 25 ns |
| V_F | 0.90 V |
| $T_J \text{ max.}$ | 175 °C |
| Package | DO-220AA (SMP) |
| Diode variations | Single die |

| MAXIMUM RATINGS ($T_A = 25\text{ °C}$ unless otherwise noted) | | | | | |
|---|----------------|-------------|--------|--------|------|
| PARAMETER | SYMBOL | ESH1PB | ESH1PC | ESH1PD | UNIT |
| Device marking code | | PB | PC | PD | |
| Maximum repetitive peak reverse voltage | V_{RRM} | 100 | 150 | 200 | V |
| Maximum average forward rectified current (fig. 1) | $I_{F(AV)}$ | 1.0 | | | 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 |


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| ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted) | | | | | |
|---|--|-------------------------------------|-------------|-------|---------------|
| PARAMETER | TEST CONDITIONS | | SYMBOL | VALUE | UNIT |
| Maximum instantaneous forward voltage | $I_F = 0.7\text{ A}$ | $T_J = 25\text{ }^{\circ}\text{C}$ | $V_F^{(1)}$ | 0.86 | V |
| | $I_F = 1\text{ A}$ | | | 0.90 | |
| Maximum reverse current at rated V_R voltage | | $T_J = 25\text{ }^{\circ}\text{C}$ | $I_R^{(2)}$ | 1.0 | μA |
| | | $T_J = 125\text{ }^{\circ}\text{C}$ | | 25 | |
| Maximum reverse current | $V_R = 20\text{ V}$ | $T_J = 150\text{ }^{\circ}\text{C}$ | I_R | 50 | μA |
| Maximum reverse recovery time | $I_F = 0.5\text{ A}$, $I_R = 1\text{ A}$, $I_{rr} = 0.25\text{ A}$ | | t_{rr} | 25 | ns |
| Typical reverse recovery time | $I_F = 1.0\text{ A}$, $V_R = 30\text{ V}$, $dI/dt = 50\text{ A}/\mu\text{s}$, $I_{rr} = 10\% I_{RM}$ | $T_J = 25\text{ }^{\circ}\text{C}$ | t_{rr} | 25 | ns |
| | | $T_J = 100\text{ }^{\circ}\text{C}$ | | 35 | |
| Typical stored charge | $I_F = 1.0\text{ A}$, $V_R = 30\text{ V}$, $dI/dt = 50\text{ A}/\mu\text{s}$, $I_{rr} = 10\% I_{RM}$ | $T_J = 25\text{ }^{\circ}\text{C}$ | Q_{rr} | 10 | nC |
| | | $T_J = 100\text{ }^{\circ}\text{C}$ | | 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 | ESH1PB | ESH1PC | ESH1PD | UNIT |
| Typical thermal resistance | R _{θJA} ⁽¹⁾ | 105 | | | °C/W |
| | R _{θJM} ⁽²⁾ | 15 | | | |

Notes

(1) Thermal resistance from junction to ambient on free air

(2) Mounted on 6 mm x 6 mm pad size from junction to mount

| ORDERING INFORMATION (Example) | | | | |
|--------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| ESH1PB-M3/84A | 0.024 | 84A | 3000 | 7" diameter plastic tape and reel |
| ESH1PB-M3/85A | 0.024 | 85A | 10 000 | 13" diameter plastic tape and reel |
| ESH1PBHM3/84A ⁽¹⁾ | 0.024 | 84A | 3000 | 7" diameter plastic tape and reel |
| ESH1PBHM3/85A ⁽¹⁾ | 0.024 | 85A | 10 000 | 13" diameter plastic tape and reel |

Note

⁽¹⁾ Automotive grade



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

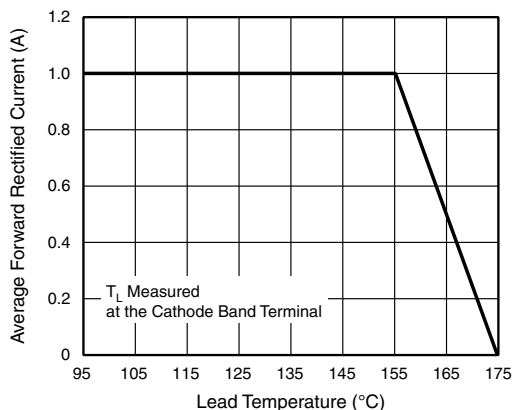


Fig. 1 - Forward Current Derating Curve

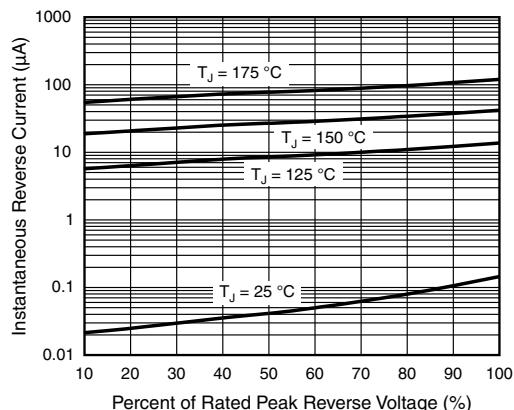


Fig. 4 - Typical Reverse Leakage Characteristics

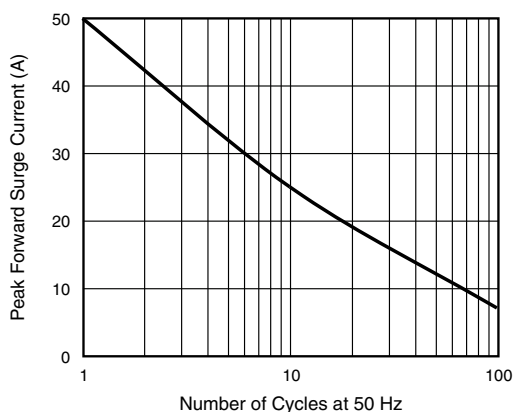


Fig. 2 - Maximum Non-Repetitive Peak Forward Surge Current

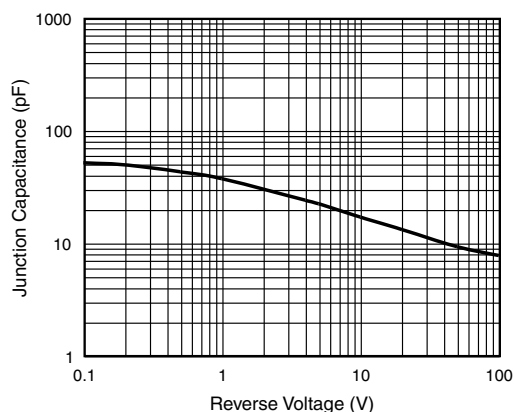


Fig. 5 - Typical Junction Capacitance

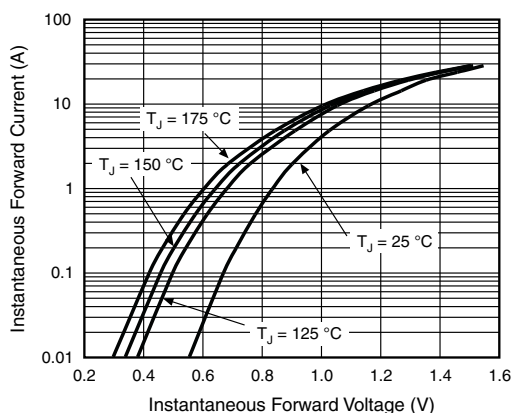


Fig. 3 - Typical Instantaneous Forward Characteristics

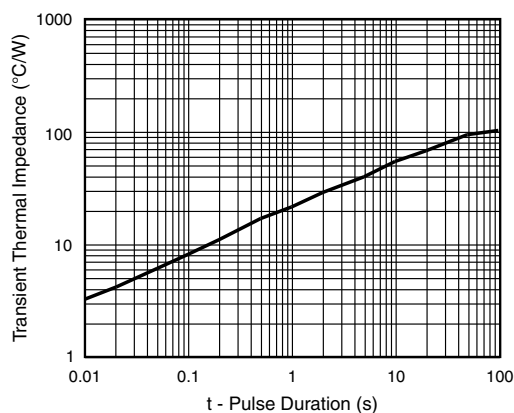


Fig. 6 - Typical Transient Thermal Impedance



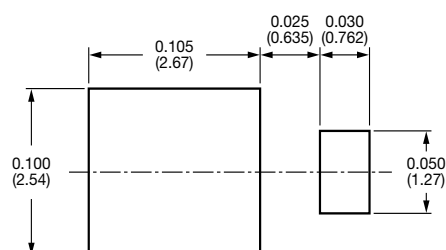
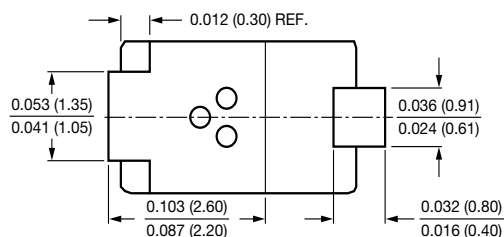
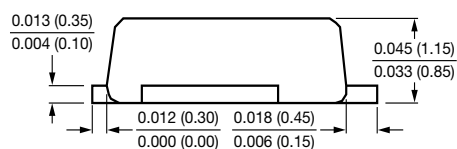
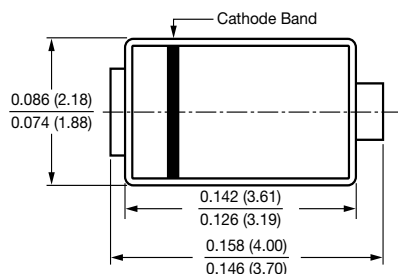
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PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

DO-220AA (SMP)





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