



## High Current Density Surface Mount Ultrafast Rectifiers

### eSMP<sup>®</sup> Series



DO-220AA (SMP)

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
$T_J$ max.	175 °C

### 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.

### FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Glass passivated 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
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21 definition

AUTOMOTIVE  
GRADE  
Available



RoHS  
COMPLIANT  
HALOGEN  
FREE

### 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 1A whisker test, HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** Color band denotes cathode end

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

# ESH1PB, ESH1PC, ESH1PD



Vishay General Semiconductor

ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted)					
PARAMETER	TEST CONDITIONS		SYMBOL	VALUE	UNIT
Maximum instantaneous forward voltage	I <sub>F</sub> = 0.7 A	T <sub>J</sub> = 25 °C	V <sub>F</sub> <sup>(1)</sup>	0.86	V
	I <sub>F</sub> = 1 A			0.90	
Maximum reverse current at rated V <sub>R</sub> voltage		T <sub>J</sub> = 25 °C	I <sub>R</sub> <sup>(2)</sup>	1.0	μA
		T <sub>J</sub> = 125 °C		25	
Maximum reverse current	V <sub>R</sub> = 20 V	T <sub>J</sub> = 150 °C	I <sub>R</sub>	50	μA
Maximum reverse recovery time	I <sub>F</sub> = 0.5 A, I <sub>R</sub> = 1 A, I <sub>rr</sub> = 0.25 A		t <sub>rr</sub>	25	ns
Typical reverse recovery time	I <sub>F</sub> = 1.0 A, V <sub>R</sub> = 30 V, dl/dt = 50 A/μs, I <sub>rr</sub> = 10 % I <sub>RM</sub>	T <sub>J</sub> = 25 °C	t <sub>rr</sub>	25	ns
		T <sub>J</sub> = 100 °C		35	
Typical stored charge	I <sub>F</sub> = 1.0 A, V <sub>R</sub> = 30 V, dl/dt = 50 A/μs, I <sub>rr</sub> = 10 % I <sub>RM</sub>	T <sub>J</sub> = 25 °C	Q <sub>rr</sub>	10	nC
		T <sub>J</sub> = 100 °C		15	
Typical junction capacitance	4.0 V, 1 MHz		C <sub>J</sub>	25	pF

**Notes**

- (1) Pulse test: 300 μs pulse width, 1 % duty cycle
- (2) Pulse test: Pulse width ≤ 40 ms

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 <sup>(1)</sup>	0.024	84A	3000	7" diameter plastic tape and reel
ESH1PBHM3/85A <sup>(1)</sup>	0.024	85A	10 000	13" diameter plastic tape and reel

**Note**

- (1) Automotive grade

## RATINGS AND CHARACTERISTICS CURVES

(T<sub>A</sub> = 25 °C unless otherwise noted)

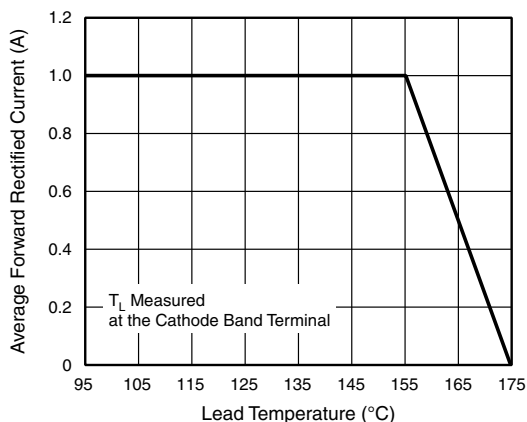


Fig. 1 - Forward Current Derating Curve

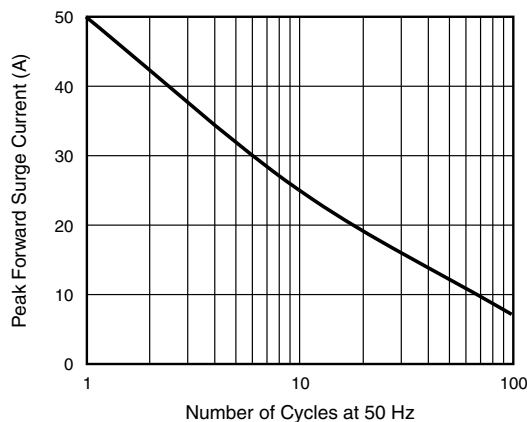


Fig. 2 - Maximum Non-Repetitive Peak Forward Surge Current

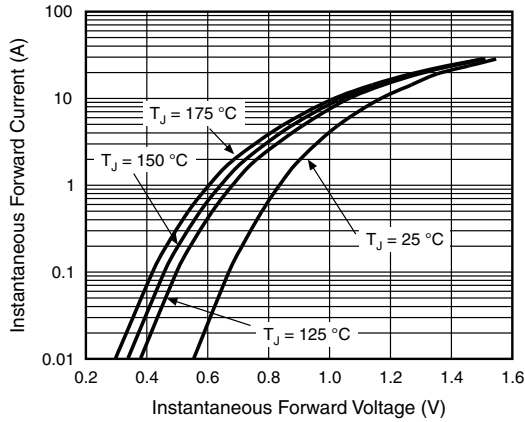


Fig. 3 - Typical Instantaneous Forward Characteristics

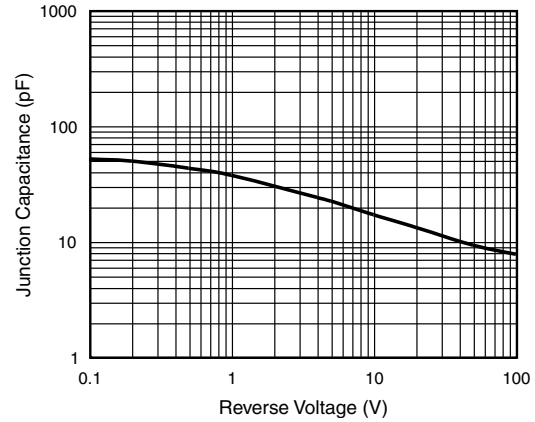


Fig. 5 - Typical Junction Capacitance

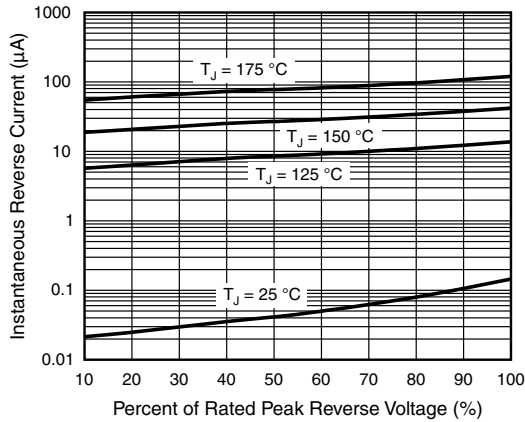


Fig. 4 - Typical Reverse Leakage Characteristics

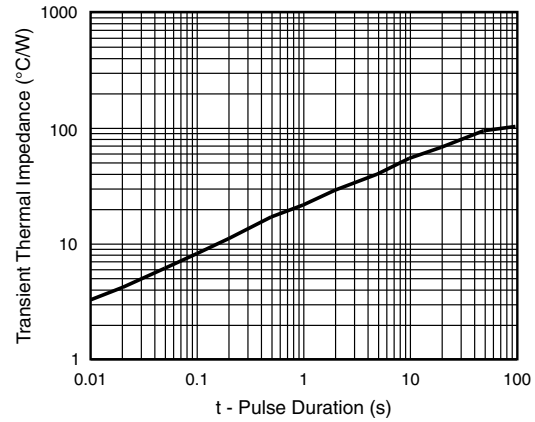
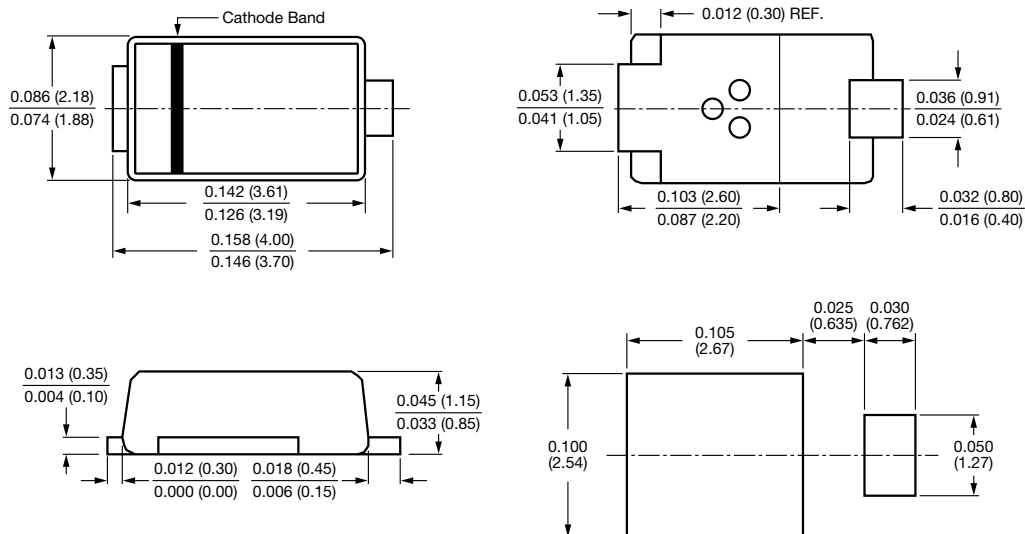


Fig. 6 - Typical Transient Thermal Impedance

## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

### DO-220AA (SMP)





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