

# High Current Density Surface Mount Ultrafast Rectifiers

## eSMP® Series



**DO-220AA (SMP)**

## FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Glass passivated pellet chip junction
- Ultrafast recovery times for high efficiency
- Low forward voltage, 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](http://www.vishay.com/doc?99912)

**AUTOMOTIVE  
GRADE**  
Available



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

## TYPICAL APPLICATIONS

For use in secondary rectification and freewheeling for ultrafast switching speeds of AC/DC and DC/DC converters 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 the cathode end

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	1.0 A
$V_{RRM}$	100 V, 150 V, 200 V
$t_{rr}$	15 ns
$V_F$ at $I_F$	0.92 V
$T_J$ max.	150 °C
Package	DO-220AA (SMP)
Diode variations	Single die

MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)					
PARAMETER	SYMBOL	ES1PB	ES1PC	ES1PD	UNIT
Device marking code		EB	EC	ED	
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	$I_{FSM}$	30			A
Operating junction and storage temperature range	$T_J, T_{STG}$	-55 to +150			°C



<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)					
PARAMETER	TEST CONDITIONS		SYMBOL	VALUE	UNIT
Maximum instantaneous forward voltage	$I_F = 0.6\text{ A}$	$T_J = 25\text{ }^{\circ}\text{C}$	$V_F^{(1)}$	0.865	V
	$I_F = 1\text{ A}$			0.920	
Maximum reverse current at rated $V_R$		$T_J = 25\text{ }^{\circ}\text{C}$	$I_R^{(2)}$	5.0	$\mu\text{A}$
		$T_J = 125\text{ }^{\circ}\text{C}$		500	
Maximum reverse recovery time	$I_F = 0.5\text{ A}$ , $I_R = 1\text{ A}$ , $I_{rr} = 0.25\text{ A}$		$t_{rr}$	15	ns
Typical reverse recovery time	$I_F = 1.0\text{ A}$ , $V_R = 30\text{ V}$ , $dI/dt = 50\text{ A}/\mu\text{s}$ , $I_{rr} = 10\text{ }\%$ $I_{RM}$	$T_J = 25\text{ }^{\circ}\text{C}$	$t_{rr}$	25	ns
		$T_J = 100\text{ }^{\circ}\text{C}$		30	
Typical stored charge	$I_F = 1.0\text{ A}$ , $V_R = 30\text{ V}$ , $dI/dt = 50\text{ A}/\mu\text{s}$ , $I_{rr} = 10\text{ }\%$ $I_{RM}$	$T_J = 25\text{ }^{\circ}\text{C}$	$Q_{rr}$	8	nC
		$T_J = 100\text{ }^{\circ}\text{C}$		10	
Typical junction capacitance	4.0 V, 1 MHz		$C_J$	10	pF

**Notes**

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

THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted)					
PARAMETER	SYMBOL	ES1PB	ES1PC	ES1PD	UNIT
Typical thermal resistance	R <sub>θJA</sub> <sup>(1)</sup>	105			°C/W
	R <sub>θJL</sub> <sup>(1)</sup>	15			
	R <sub>θJC</sub> <sup>(1)</sup>	20			

**Note**

- (1) Thermal resistance from junction to ambient and junction to lead mounted on PCB with 5.0 mm x 5.0 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

<b>ORDERING INFORMATION</b> (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
ES1PB-M3/84A	0.024	84A	3000	7" diameter plastic tape and reel
ES1PB-M3/85A	0.024	85A	10 000	13" diameter plastic tape and reel
ES1PBHM3/84A <sup>(1)</sup>	0.024	84A	3000	7" diameter plastic tape and reel
ES1PBHM3/85A <sup>(1)</sup>	0.024	85A	10 000	13" diameter plastic tape and reel

**Note**

- (1) Automotive grade

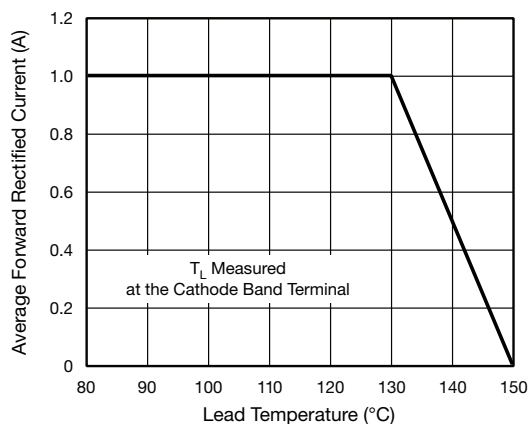
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

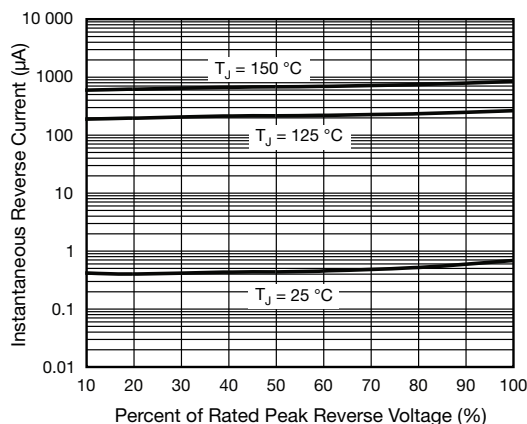


Fig. 4 - Typical Reverse Leakage Characteristics

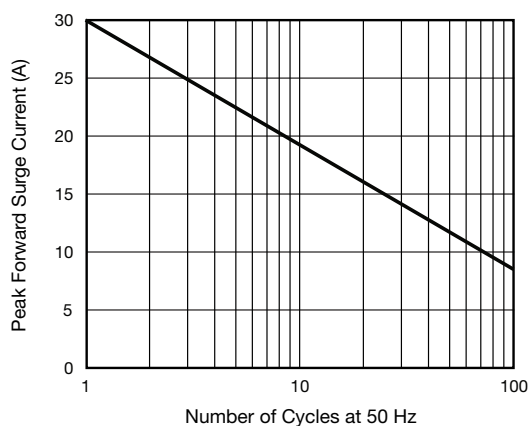


Fig. 2 - Maximum Non-Repetitive Peak Forward Surge Current

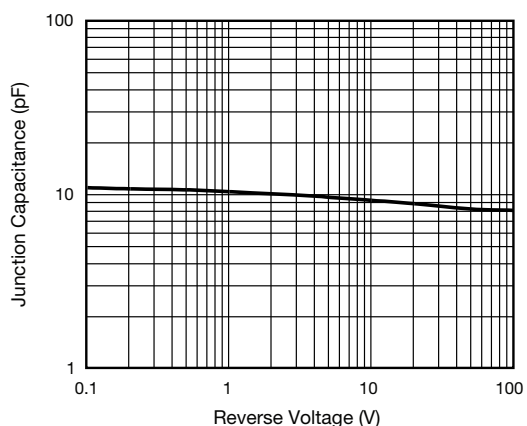


Fig. 5 - Typical Junction Capacitance

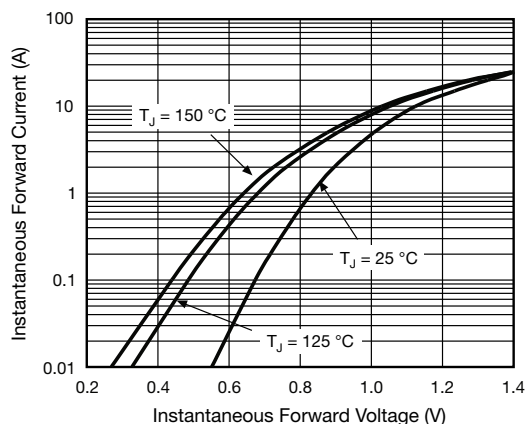


Fig. 3 - Typical Instantaneous Forward Characteristics

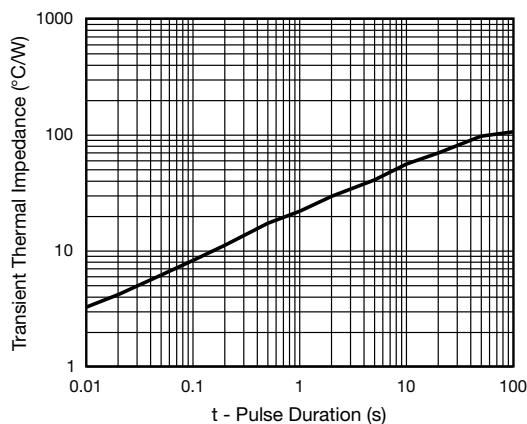
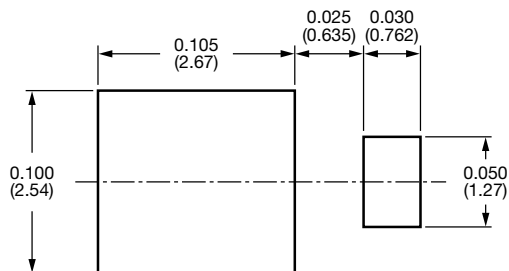
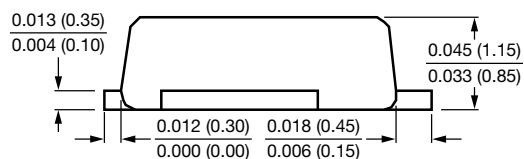
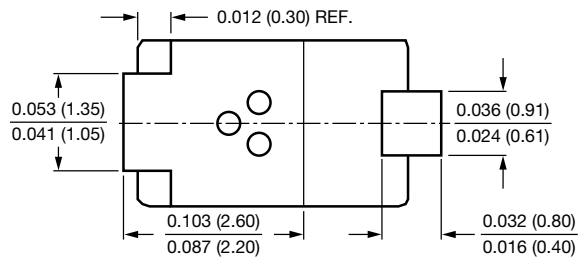
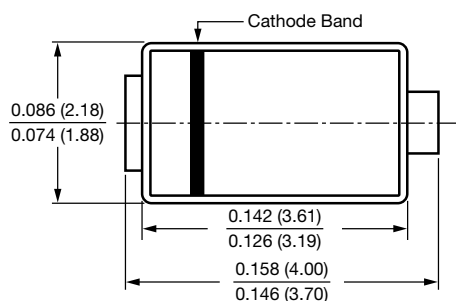


Fig. 6 - Typical Transient Thermal Impedance



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

DO-220AA (SMP)





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