

## 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 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
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



RoHS  
COMPLIANT

### TYPICAL APPLICATIONS

For use in secondary rectification and freewheeling for ultrafast switching speeds of ac-to-dc and dc-to-dc converters for both consumer and automotive applications.

### MECHANICAL DATA

**Case:** DO-220AA (SMP)

Epoxy meets UL 94 V-0 flammability rating

**Terminals:** Matte tin plated leads, solderable per J-STD-002 and JESD22-B102

E3 suffix for consumer grade, meets JESD 201 class 1A whisker test, HE3 suffix for high reliability grade (AEC Q101 qualified), 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
$t_{tr}$	15 ns
$V_F$	0.92 V
$T_J \text{ max.}$	150 °C

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

ELECTRICAL CHARACTERISTICS ( $T_A = 25\text{ °C}$ unless otherwise noted)					
PARAMETER	TEST CONDITIONS		SYMBOL	VALUE	UNIT
Maximum instantaneous forward voltage <sup>(1)</sup>	$I_F = 0.6\text{ A}$ $I_F = 1\text{ A}$	$T_J = 25\text{ °C}$	$V_F$	0.865 0.920	V
Maximum reverse current at rated $V_R$ <sup>(2)</sup>		$T_J = 25\text{ °C}$ $T_J = 125\text{ °C}$	$I_R$	5.0 500	$\mu\text{A}$



<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)				
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
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	$I_F = 1.0\text{ A}$ , $V_R = 30\text{ V}$ , $di/dt = 50\text{ A}/\mu\text{s}$ , $I_{rr} = 10\% I_{RM}$	$t_{rr}$	25 30	ns
Typical stored charge	$I_F = 1.0\text{ A}$ , $V_R = 30\text{ V}$ , $di/dt = 50\text{ A}/\mu\text{s}$ , $I_{rr} = 10\% I_{RM}$	$Q_{rr}$	8 10	nC
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  $\leq 40\text{ ms}$

<b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)					
PARAMETER	SYMBOL	ES1PB	ES1PC	ES1PD	UNIT
Typical thermal resistance <sup>(1)</sup>	$R_{\theta JA}$		105		$^\circ\text{C}/\text{W}$
	$R_{\theta JL}$		15		
	$R_{\theta JC}$		20		

**Note:**

- (1) Thermal resistance from junction to ambient and junction to lead mounted on P.C.B. with 5.0 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-E3/84A	0.024	84A	3000	7" diameter plastic tape and reel
ES1PB-E3/85A	0.024	85A	10 000	13" diameter plastic tape and reel
ES1PBHE3/84A <sup>(1)</sup>	0.024	84A	3000	7" diameter plastic tape and reel
ES1PBHE3/85A <sup>(1)</sup>	0.024	85A	10 000	13" diameter plastic tape and reel

**Note:**

- (1) Automotive grade AEC Q101 qualified

**RATINGS AND CHARACTERISTICS CURVES**

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

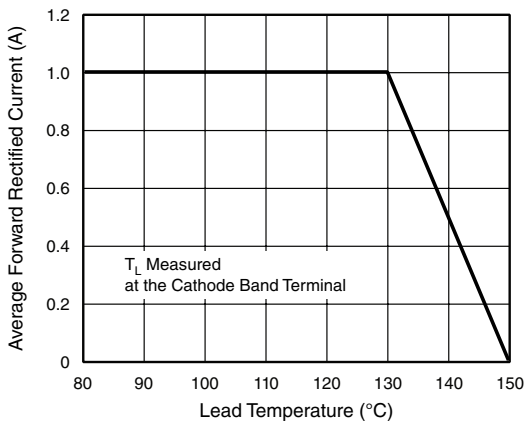


Figure 1. Maximum Forward Current Derating Curve

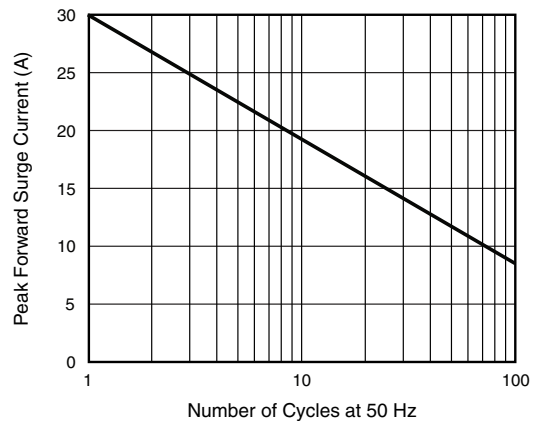


Figure 2. Maximum Non-Repetitive Peak Forward Surge Current

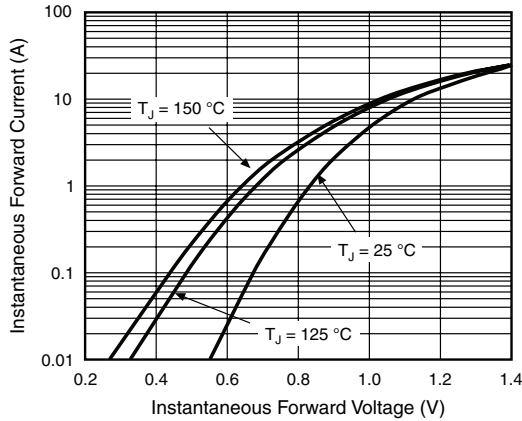


Figure 3. Typical Instantaneous Forward Characteristics

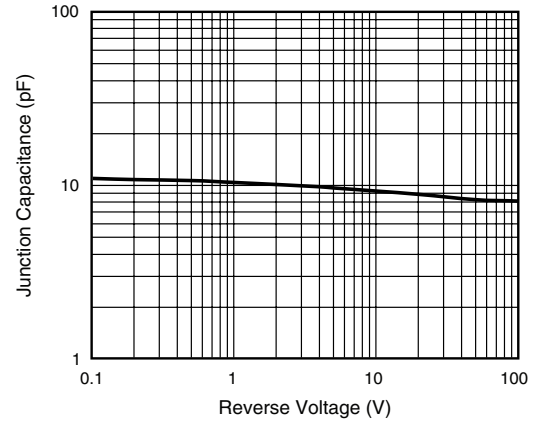


Figure 5. Typical Junction Capacitance

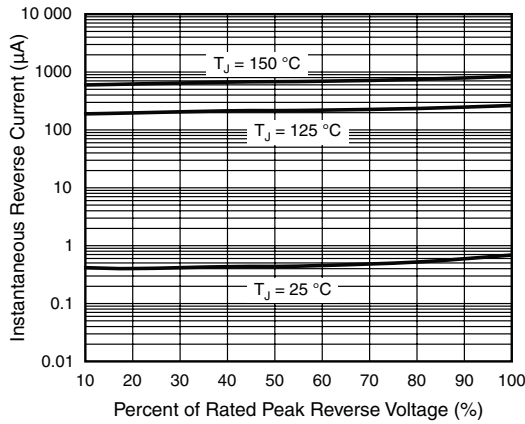


Figure 4. Typical Reverse Leakage Characteristics

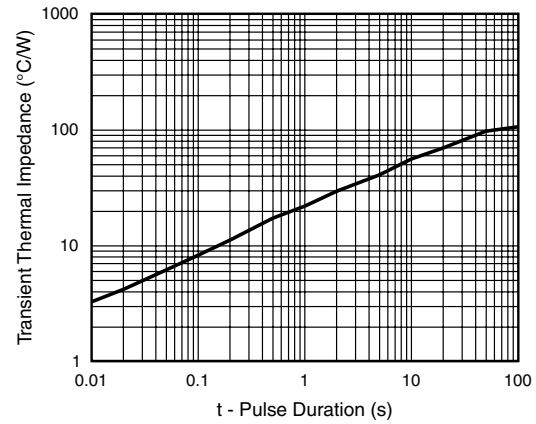
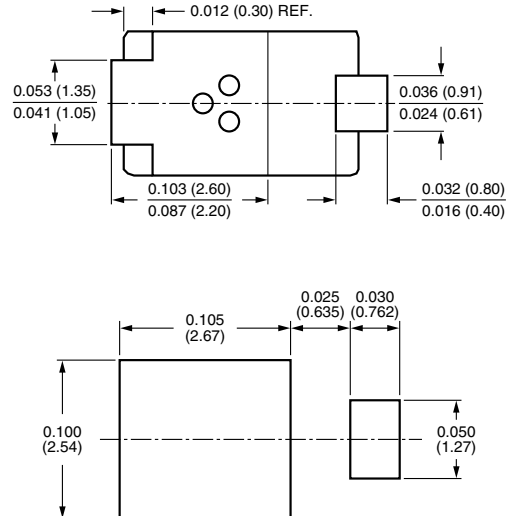
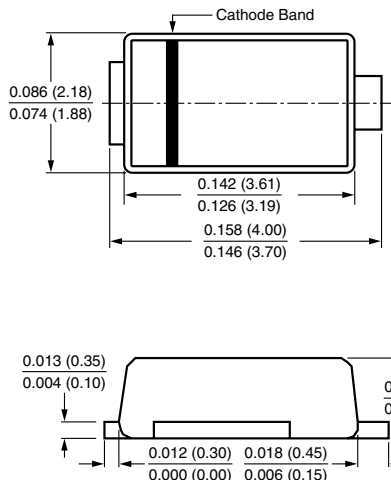


Figure 6. Typical Transient Thermal Impedance

**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

**DO-220AA (SMP)**





## Disclaimer

All product specifications and data are subject to change without notice.

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