



## High Current Density Surface Mount Ultrafast Rectifiers

### eSMP™ Series



DO-220AA (SMP)

#### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	1.0 A
$V_{RRM}$	100 V, 150 V, 200 V
$t_{rr}$	15 ns
$V_F$	0.92 V
$T_J$ max.	150 °C

#### 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.

#### 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
- 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**
- Find out more about Vishay's Automotive Grade Product requirements at: [www.vishay.com/applications](http://www.vishay.com/applications)



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

**AUTOMOTIVE**  
GRADE  
Available

#### MECHANICAL DATA

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

Molding compound meets UL 94 V-0 flammability rating

Base P/N-M3 - halogen-free and RoHS compliant, commercial grade

Base P/NHM3 - halogen-free and RoHS compliant, 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 the cathode end

#### MAXIMUM RATINGS ( $T_A = 25$ °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

# ES1PB, ES1PC & ES1PD

Vishay General Semiconductor



ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted)					
PARAMETER	TEST CONDITIONS		SYMBOL	VALUE	UNIT
Maximum instantaneous forward voltage <sup>(1)</sup>	I <sub>F</sub> = 0.6 A I <sub>F</sub> = 1 A	T <sub>J</sub> = 25 °C	V <sub>F</sub>	0.865 0.920	V
Maximum reverse current at rated V <sub>R</sub> <sup>(2)</sup>		T <sub>J</sub> = 25 °C T <sub>J</sub> = 125 °C	I <sub>R</sub>	5.0 500	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>	15	ns
Typical reverse recovery time	I <sub>F</sub> = 1.0 A, V <sub>R</sub> = 30 V, dI/dt = 50 A/μs, I <sub>rr</sub> = 10 % I <sub>RM</sub>	T <sub>J</sub> = 25 °C T <sub>J</sub> = 100 °C	t <sub>rr</sub>	25 30	ns
Typical stored charge	I <sub>F</sub> = 1.0 A, V <sub>R</sub> = 30 V, dI/dt = 50 A/μs, I <sub>rr</sub> = 10 % I <sub>RM</sub>	T <sub>J</sub> = 25 °C T <sub>J</sub> = 100 °C	Q <sub>rr</sub>	8 10	nC
Typical junction capacitance	4.0 V, 1 MHz		C <sub>J</sub>	10	pF

**Notes:**

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

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

**Note:**

- <sup>(1)</sup> Thermal resistance from junction to ambient and junction to lead mounted on P.C.B. with 5.0 mm x 5.0 mm copper pad areas. R<sub>θJL</sub> is measured at the terminal of cathode band. R<sub>θJC</sub> 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
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:**

- <sup>(1)</sup> Automotive grade

## RATINGS AND CHARACTERISTICS CURVES

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

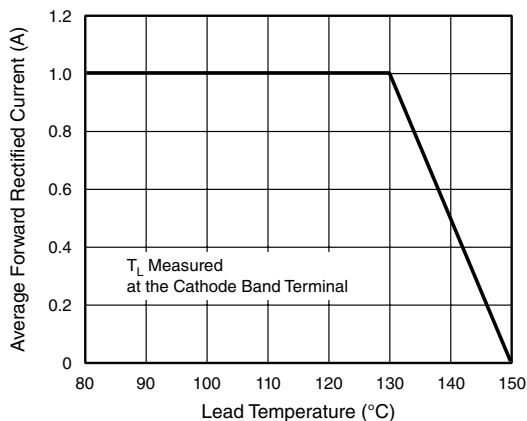


Figure 1. Maximum Forward Current Derating Curve

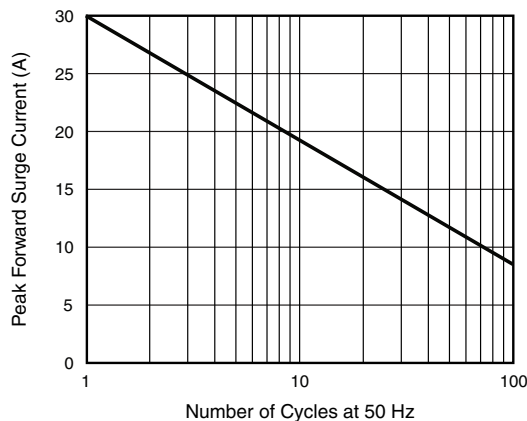


Figure 2. Maximum Non-Repetitive Peak Forward Surge Current



# ES1PB, ES1PC & ES1PD

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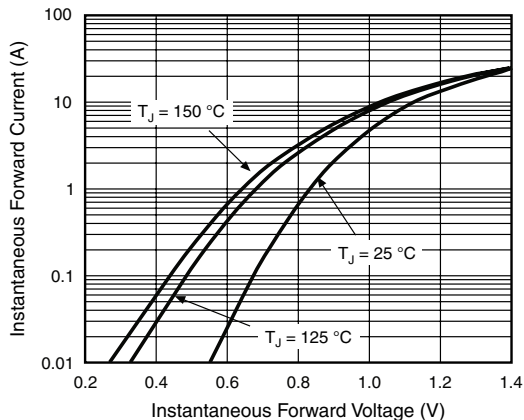


Figure 3. Typical Instantaneous Forward Characteristics

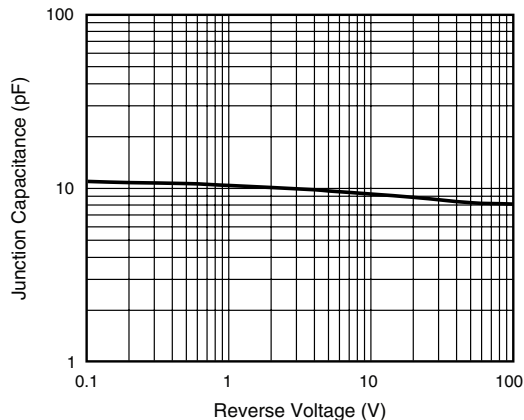


Figure 5. Typical Junction Capacitance

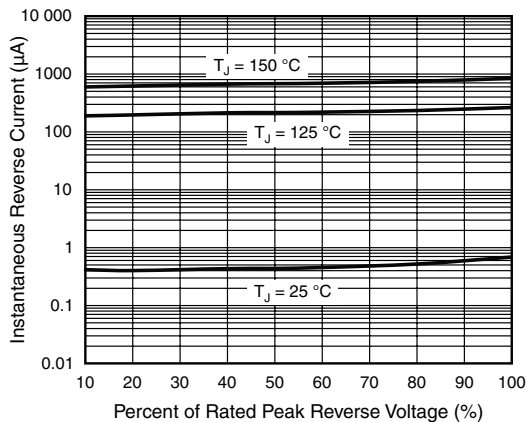


Figure 4. Typical Reverse Leakage Characteristics

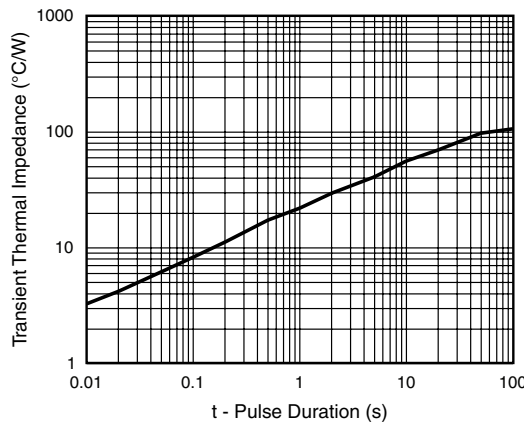
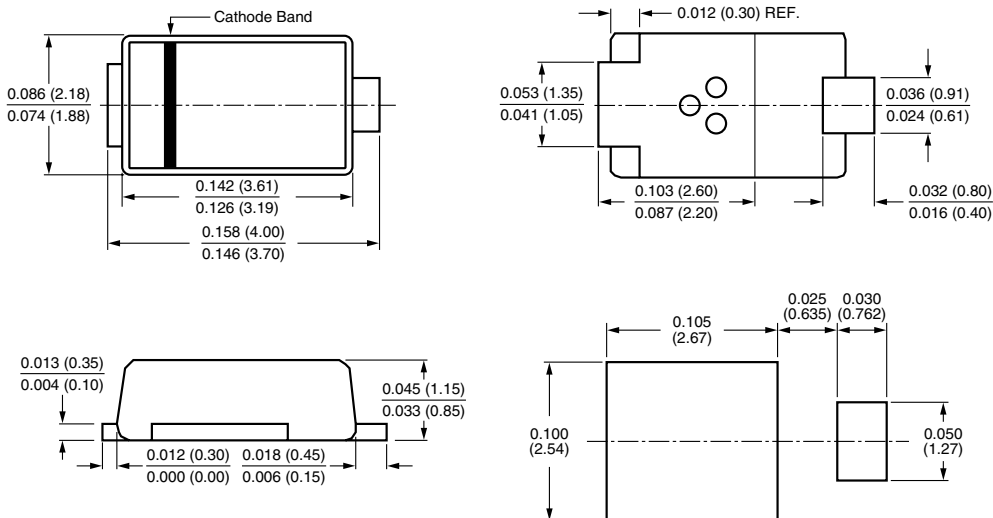


Figure 6. Typical Transient Thermal Impedance

## 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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