


# Ultrafast Rectifier, 1 A FRED Pt®

## eSMP® Series


**SMP (DO-220AA)**

Cathode  Anode

## LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	1 A
$V_R$	100 V, 200 V
$V_F$ at $I_F$	0.69 V
$I_{FSM}$	40 A
$t_{rr}$ (typ.)	23 ns
$T_J$ max.	175 °C
Package	SMP (DO-220AA)
Circuit configuration	Single

## FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Low forward voltage drop, low power losses
- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- For PFC, CRM snubber operation
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


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

## TYPICAL APPLICATIONS

For use in high frequency, freewheeling, DC/DC converters, PFC, and in snubber industrial and automotive applications.

## MECHANICAL DATA

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

Molding compound meets UL 94 V-0 flammability rating

**Terminals:** matte tin plated leads, solderable per J-STD-002, meets JESD 201 class 2 whisker test

**Polarity:** color band denotes cathode end

ABSOLUTE MAXIMUM RATINGS					
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	VS-1ENH01-M3	V <sub>RRM</sub>		100	V
	VS-1ENH02-M3			200	
Average rectified forward current		I <sub>F(AV)</sub>	T <sub>C</sub> = 168 °C	1	A
Non-repetitive peak surge current		I <sub>FSM</sub>	T <sub>J</sub> = 25 °C, 10 ms sine pulse	40	
Operating junction and storage temperatures		T <sub>J</sub> , T <sub>Stg</sub>		-55 to +175	°C

ELECTRICAL SPECIFICATIONS (T <sub>J</sub> = 25 °C unless otherwise specified)							
PARAMETER		SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	VS-1ENH01-M3	V <sub>BR</sub> , V <sub>R</sub>	I <sub>R</sub> = 100 μA	100	-	-	V
	VS-1ENH02-M3			200	-	-	
Forward voltage		V <sub>F</sub>	I <sub>F</sub> = 1 A	-	0.86	0.92	
			I <sub>F</sub> = 1 A, T <sub>J</sub> = 150 °C	-	0.69	0.74	
Reverse leakage current		I <sub>R</sub>	V <sub>R</sub> = V <sub>R</sub> rated	-	-	2	μA
			T <sub>J</sub> = 150 °C, V <sub>R</sub> = V <sub>R</sub> rated	-	-	20	
Junction capacitance		C <sub>T</sub>	V <sub>R</sub> = 200 V	-	8	-	pF

<b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 1.0\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	23	-	ns
		$I_F = 0.5\text{ A}$ , $I_R = 1\text{ A}$ , $I_{rr} = 0.25\text{ A}$	-	-	28	
		$T_J = 25\text{ }^{\circ}\text{C}$	-	14	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	22	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	1.7	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	2.7	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	10	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	29	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$		-55	-	175	$^{\circ}\text{C}$
Thermal resistance, junction mount	$R_{thJM}^{(1)}$	Infinite heatsink	-	7	9	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction to ambient	$R_{thJA}$	PCB footprint 4.8 mm x 4.8 mm	-	107	-	
Approximate weight				0.024		g
Marking device	VS-1ENH01-M3	Case style SMP (DO-220AA)		1H1		
	VS-1ENH02-M3			1H2		

**Note**

(1) Thermal resistance junction to mount follows JEDEC® 51-14 transient dual interface test method (TDIM)

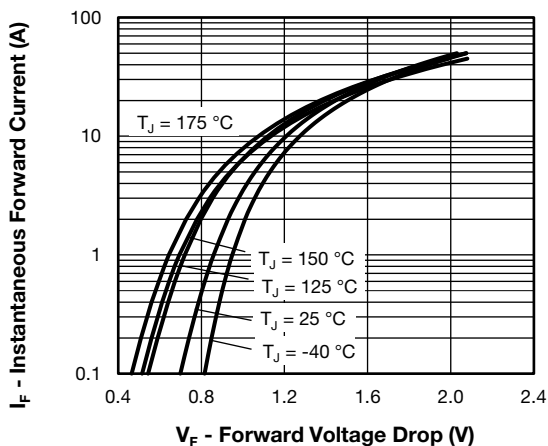


Fig. 1 - Typical Forward Voltage Drop Characteristics

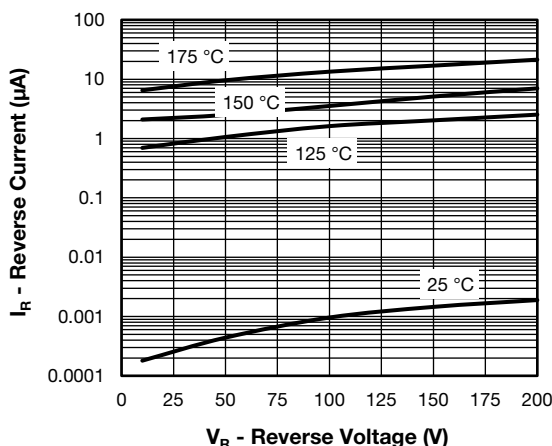


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

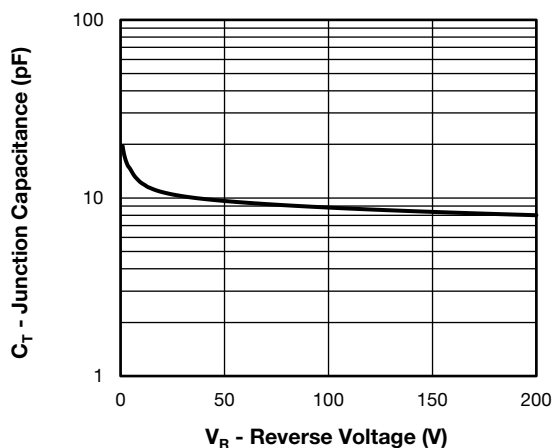


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

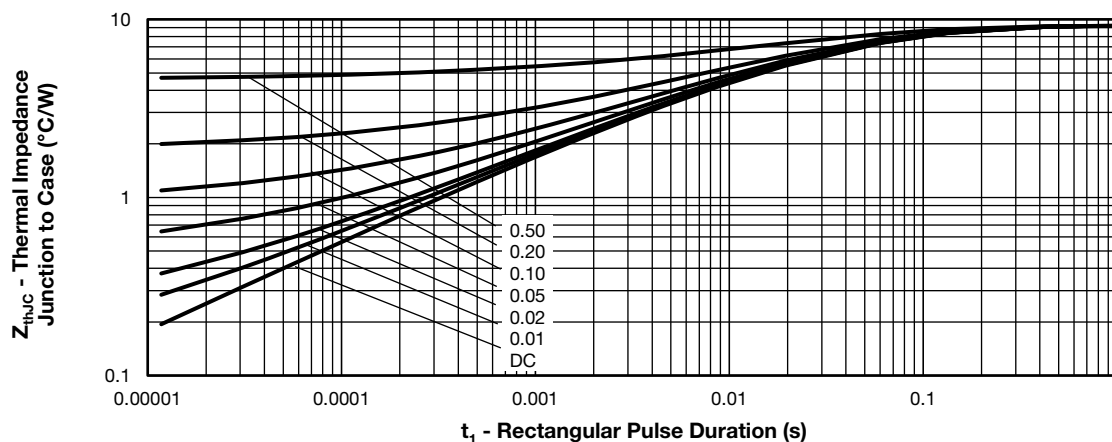


Fig. 4 - Transient Thermal Impedance, Junction to Case

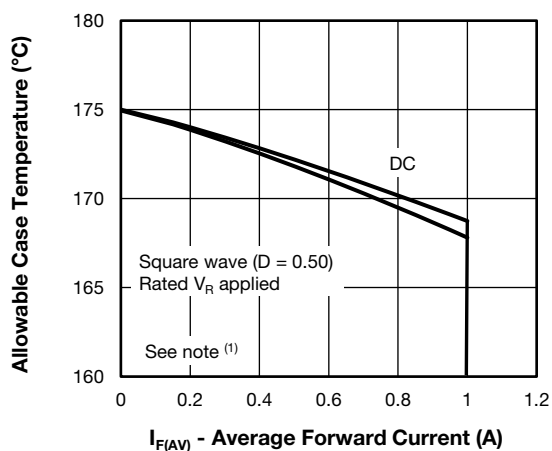


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

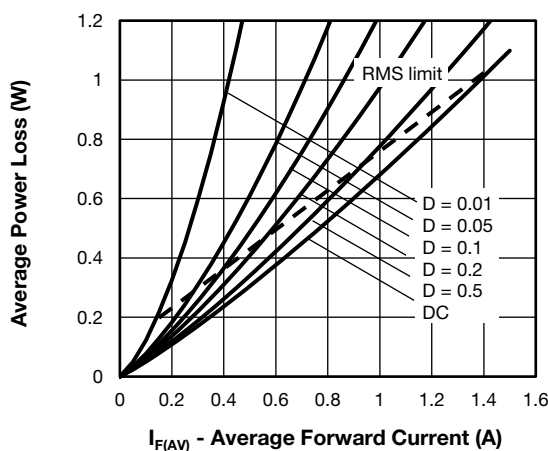


Fig. 6 - Forward Power Loss Characteristics

#### Note

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{\theta JC}$ ;  
 $P_d$  = forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 5);  
 $P_{dREV}$  = inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1}$  = rated  $V_R$

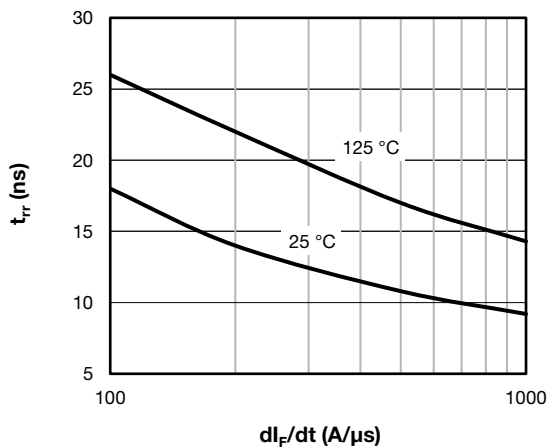
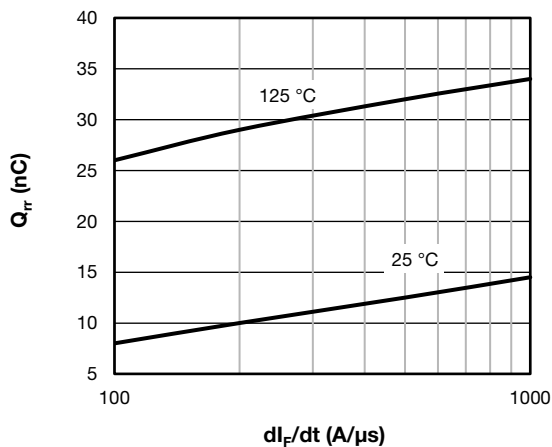
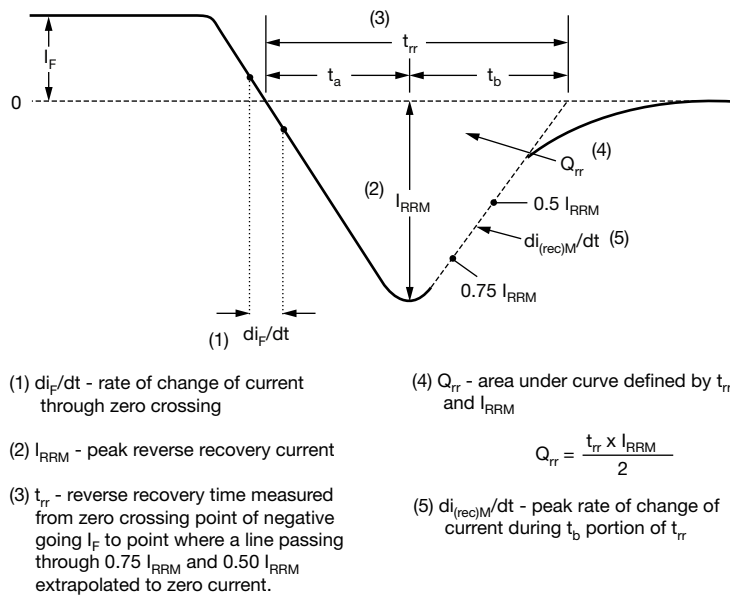

Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$ 

Fig. 8 - Typical Stored Charge vs.  $dI_F/dt$ 


Fig. 9 - Reverse Recovery Waveform and Definitions

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>1</b>	<b>E</b>	<b>N</b>	<b>H</b>	<b>02</b>	<b>M3</b>
	1	2	3	4	5	6	7

- |          |  |
|----------|--|
| <b>1</b> | - Vishay Semiconductors product                                      |
| <b>2</b> | - Current rating (1 = 1 A)   |
| <b>3</b> | - Circuit configuration:<br>E = single diode                         |
| <b>4</b> | - N = SMP package  |
| <b>5</b> | - Process type,<br>H = ultrafast recovery                            |
| <b>6</b> | - Voltage code (02 = 200 V)  |
| <b>7</b> | - M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free |

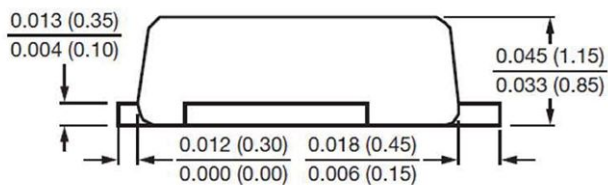
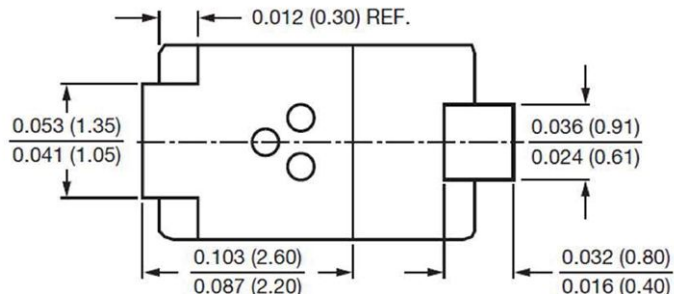
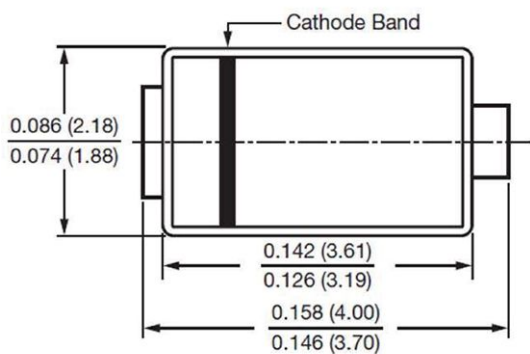
<b>ORDERING INFORMATION</b> (Example)			
PREFERRED P/N	PREFERRED PACKAGE CODE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-1ENH01-M3/84A	84A	3000	7" diameter plastic tape and reel
VS-1ENH01-M3/85A	85A	10 000	13" diameter plastic tape and reel
VS-1ENH02-M3/84A	84A	3000	7" diameter plastic tape and reel
VS-1ENH02-M3/85A	85A	10 000	13" diameter plastic tape and reel

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?96547">www.vishay.com/doc?96547</a>
Part marking information	<a href="http://www.vishay.com/doc?96574">www.vishay.com/doc?96574</a>
Packaging information	<a href="http://www.vishay.com/doc?88869">www.vishay.com/doc?88869</a>
SPICE model	<a href="http://www.vishay.com/doc?96550">www.vishay.com/doc?96550</a>

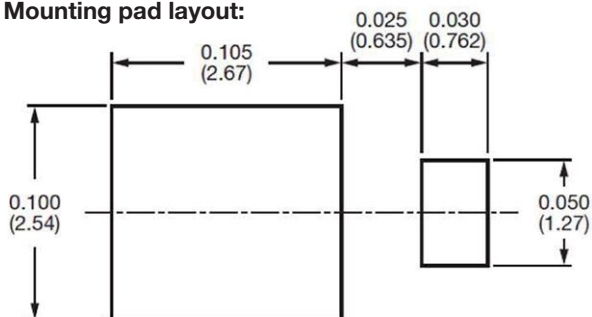


## SMP (DO-220AA)

**DIMENSIONS** in inches (millimeters)



Mounting pad layout:





## Disclaimer

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