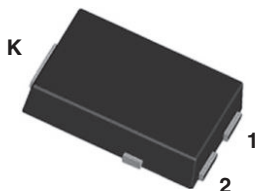
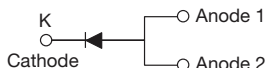


# Ultrafast Rectifier, 8 A FRED Pt®

## eSMP® Series



SMPC (TO-277A)



## FEATURES

- Ultrafast recovery time, reduced  $Q_{rr}$ , and soft recovery
- 175 °C maximum operating junction temperature
- For PFC, CRM snubber operation
- Low forward voltage drop
- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Meets JESD 201 class 2 whisker test
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

## LINKS TO ADDITIONAL RESOURCES



## PRIMARY CHARACTERISTICS

$I_{F(AV)}$	8 A
$V_R$	600 V
$V_F$ at $I_F$	1.01 V
$t_{rr}$ (typ.)	42 ns
$T_J$ max.	175 °C
Package	SMPC (TO-277A)
Circuit configuration	Single

## DESCRIPTION / APPLICATIONS

State of the art ultrafast recovery rectifiers specifically designed with optimized performance of forward voltage drop and ultra fast recovery time.

The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness, and reliability characteristics.

These devices are intended for use in PFC, boost, lighting, in the AC/DC section of SMPS, freewheeling and clamp diodes.

The extremely optimized stored charge and low recovery current minimize the switching losses and reduce power dissipation in the switching element and snubbers.

## MECHANICAL DATA

**Case:** SMPC (TO-277A)

Molding compound meets UL 94 V-0 flammability rating  
Halogen-free, RoHS-compliant

**Terminals:** matte tin plated leads, solderable per J-STD-002

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	$V_{RRM}$		600	V
Average rectified forward current	$I_{F(AV)}$	$T_{Sp} = 137\text{ °C}$	8	A
Non-repetitive peak surge current	$I_{FSM}$	$T_J = 25\text{ °C}$	120	
Operating junction and storage temperatures	$T_J, T_{Stg}$		-55 to +175	°C

## ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ °C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	$V_{BR}, V_R$	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	$V_F$	$I_F = 8\text{ A}$	-	1.16	1.36	
		$I_F = 8\text{ A}, T_J = 150\text{ °C}$	-	1.01	1.24	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	-	5	$\mu\text{A}$
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	25	150	
Junction capacitance	$C_T$	$V_R = 600\text{ V}$	-	8	-	pF

**DYNAMIC RECOVERY CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 1\text{ A}$ , $di_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	42	-	ns
		$I_F = 0.5\text{ A}$ , $I_R = 1\text{ A}$ , $I_{rr} = 0.25\text{ A}$	-	-	60	
		$T_J = 25^\circ\text{C}$	-	63	-	
		$T_J = 125^\circ\text{C}$	-	88	-	
Peak recovery current	$I_{RRM}$	$T_J = 25^\circ\text{C}$	-	12	-	A
		$T_J = 125^\circ\text{C}$	-	17	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25^\circ\text{C}$	-	460	-	nC
		$T_J = 125^\circ\text{C}$	-	930	-	

**THERMAL - MECHANICAL SPECIFICATIONS**

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 to mount	$R_{thJM}$		-	2.4	3.5	$^\circ\text{C}/\text{W}$
Approximate weight				0.1		g
Marking device		Case style SMPC (TO-277A)			QEU6	

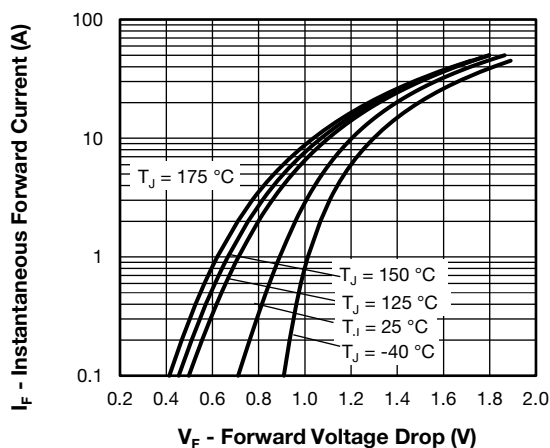


Fig. 1 - Typical Forward Voltage Drop Characteristics

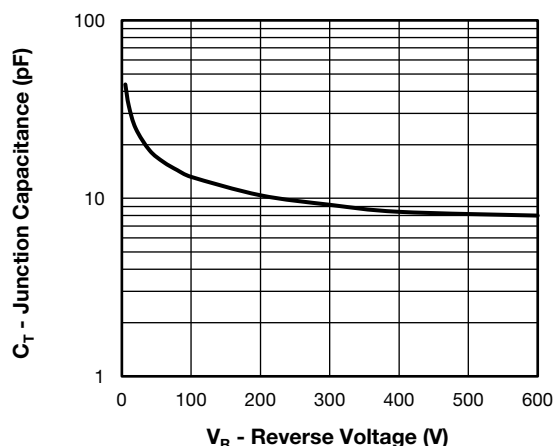


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

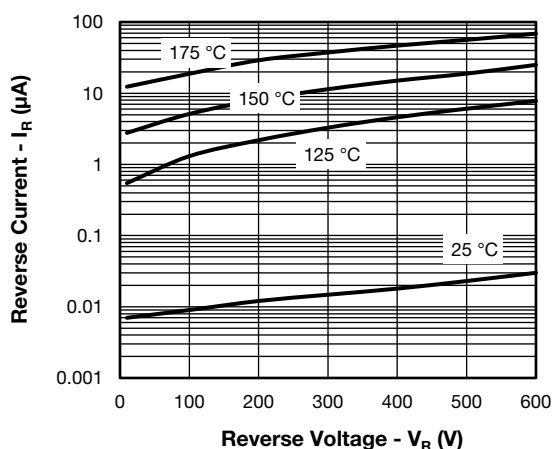


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

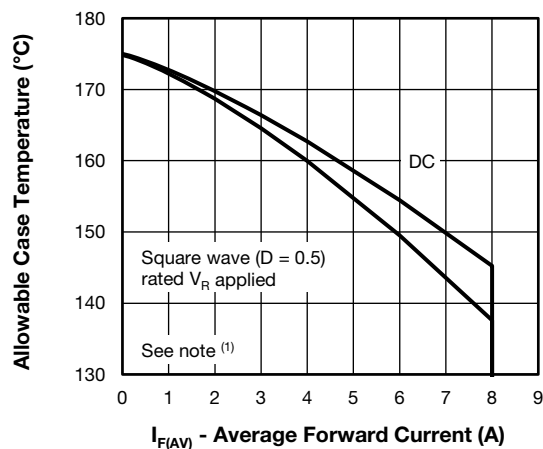


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

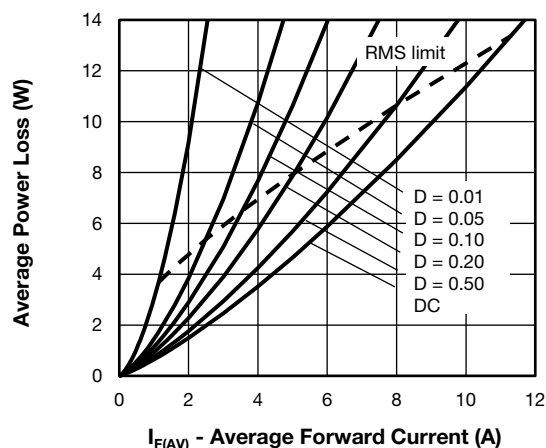
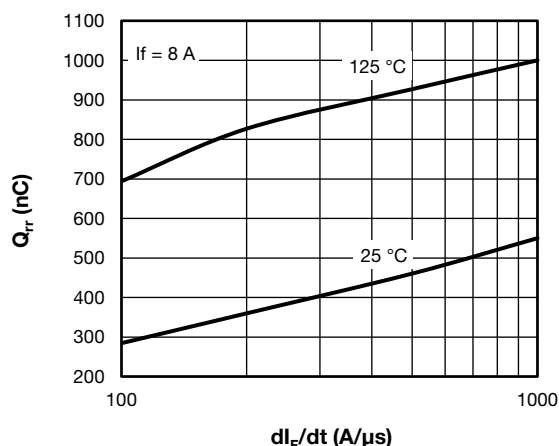
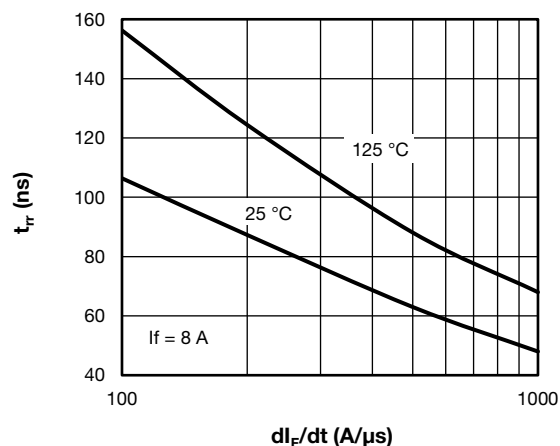
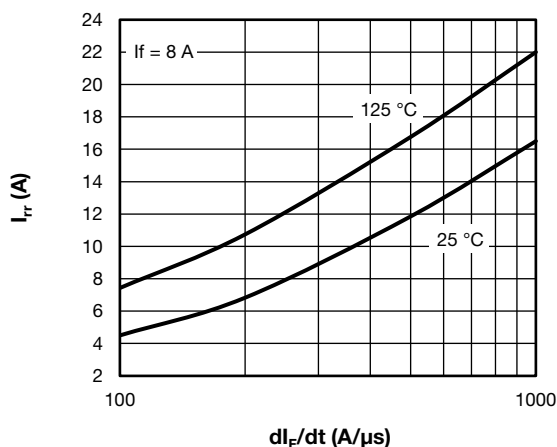


Fig. 5 - Forward Power Loss Characteristics


Fig. 7 - Typical Stored Charge vs.  $dI_F/dt$ 

Fig. 6 - Typical Reverse Recovery Time vs.  $dI_F/dt$ 

Fig. 8 - Typical Reverse Recovery Current vs.  $dI_F/dt$ 

#### Note

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = 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  $V_R$

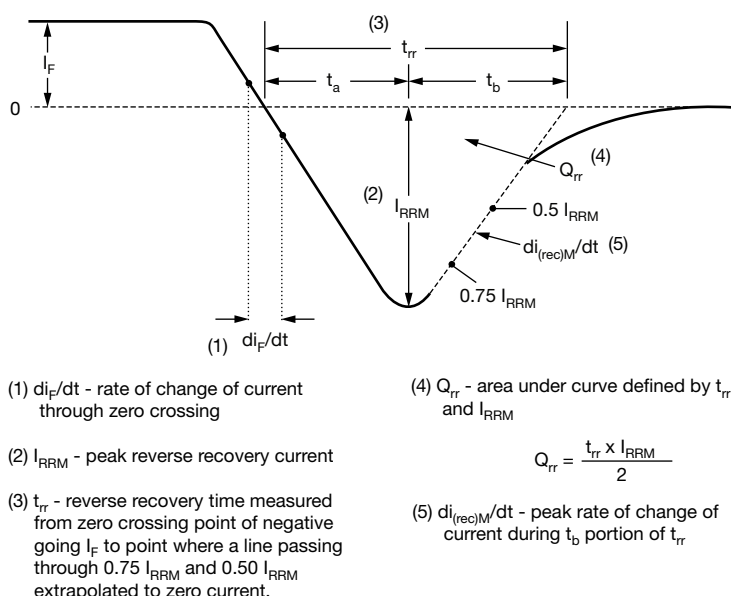


Fig. 9 - Reverse Recovery Waveform and Definitions

## ORDERING INFORMATION TABLE

**Device code**

<b>VS-</b>	<b>8</b>	<b>E</b>	<b>S</b>	<b>U</b>	<b>06</b>	<b>H</b>	<b>M3</b>
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① ② ③ ④ ⑤ ⑥ ⑦ ⑧

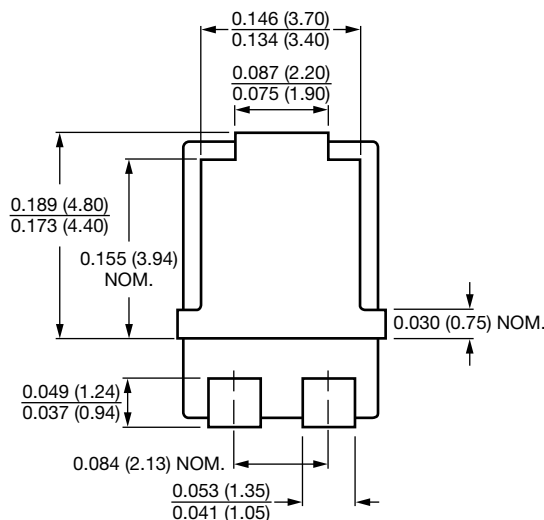
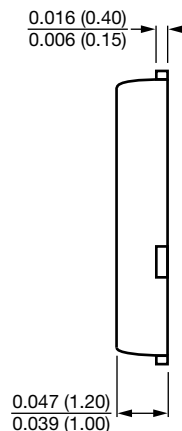
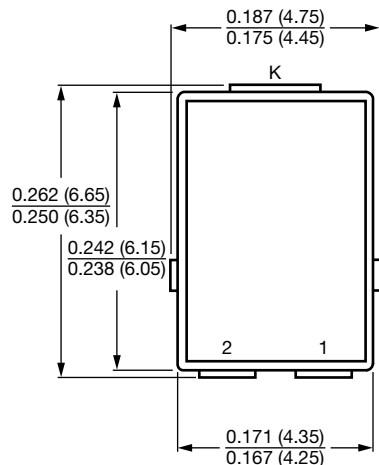
- 1 - Vishay Semiconductors product
- 2 - Current rating ( $8 = 8 \text{ A}$ )
- 3 - Circuit configuration:  
E = single diode
- 4 - S = SMPC package
- 5 - Process type,  
U = ultra fast recovery
- 6 - Voltage code (06 = 600 V)
- 7 - H = AEC-Q101 qualified
- 8 - M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER REEL	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-8ESU06HM3/H	1500	1500	7" diameter plastic tape and reel
VS-8ESU06HM3/I	6500	6500	13" diameter plastic tape and reel

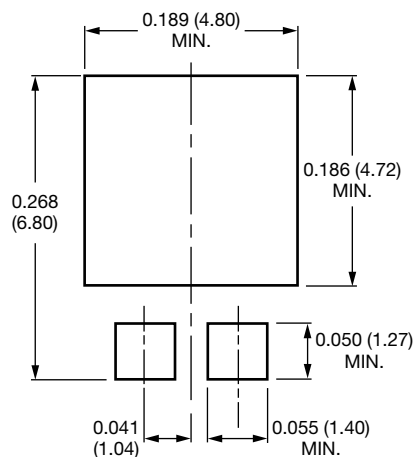
LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95570">www.vishay.com/doc?95570</a>
Part marking information	<a href="http://www.vishay.com/doc?95565">www.vishay.com/doc?95565</a>
Packaging information	<a href="http://www.vishay.com/doc?88869">www.vishay.com/doc?88869</a>

## SMPC (TO-277A)

**DIMENSIONS** in inches (millimeters)



### Mounting Pad Layout



Conform to JEDEC® TO-277A



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