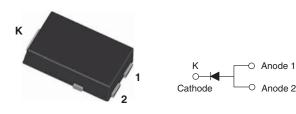


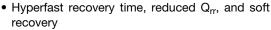
## Hyperfast Rectifier, 6 A FRED Pt®



TO-277A (SMPC)

PRODUCT SUMMARY				
Package	TO-277A (SMPC)			
I <sub>F(AV)</sub>	6 A			
$V_{R}$	600 V			
V <sub>F</sub> at I <sub>F</sub>	1.8 V			
t <sub>rr</sub> (typ.)	33 ns			
T <sub>J</sub> max.	175 °C			
Diode variation	Single die			

#### **FEATURES**





RoHS

COMPLIANT **HALOGEN** 

FREE

- 175 °C maximum operating junction temperature
- For PFC, CRM/CCM, snubber operation
- Low forward voltage drop
- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified, meets JESD 201 class 2 whisker test
- Material categorization: for definitions of compliance please see www.vishav.com/doc?99912

#### **DESCRIPTION / APPLICATIONS**

State of the art hyperfast recovery rectifiers specifically designed with optimized performance of forward voltage drop and hyperfast 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.

ABSOLUTE MAXIMUM RATINGS						
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS		
Peak repetitive reverse voltage	$V_{RRM}$		600	V		
Average rectified forward current	I <sub>F(AV)</sub>	T <sub>Sp</sub> = 145 °C	6	۸		
Non-repetitive peak surge current	I <sub>FSM</sub>	T <sub>J</sub> = 25 °C	90	Α		
Operating junction and storage temperatures	T <sub>J</sub> , T <sub>Stg</sub>		-65 to +175	°C		

<b>ELECTRICAL SPECIFICATIONS</b> (T <sub>J</sub> = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	$V_{BR}$ , $V_{R}$	I <sub>R</sub> = 100 μA	600	-	-	
Compared voltage	.,	I <sub>F</sub> = 6 A	-	1.30	1.80	V
Forward voltage	V <sub>F</sub>	I <sub>F</sub> = 6 A, T <sub>J</sub> = 150 °C	-	1.05	1.55	
Devenue le cliene e consent		V <sub>R</sub> = V <sub>R</sub> rated	-	-	5	
Reverse leakage current I <sub>R</sub>	T <sub>J</sub> = 150 °C, V <sub>R</sub> = V <sub>R</sub> rated	-	50	300	μΑ	
Junction capacitance	C <sub>T</sub>	V <sub>R</sub> = 600 V	-	8	-	pF



<b>DYNAMIC RECOVERY CHARACTERISTICS</b> (T <sub>J</sub> = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
		$I_F = 1.0 \text{ A}, dI_F/dt = 50 \text{ A/}\mu\text{s}, V_R = 30 \text{ V}$		-	33	-	
Poverse recovery time	+	$I_F = 0.5 \text{ A}, I_R = 1 \text{ A}, I_{rr} = 0.25 \text{ A}$		-	-	40	
Reverse recovery time t <sub>rr</sub>	۲rr	T <sub>J</sub> = 25 °C		-	40	-	ns
	T <sub>J</sub> = 125 °C	I <sub>F</sub> = 6 A	-	75	-		
Peak recovery current I <sub>RRM</sub>	T <sub>J</sub> = 25 °C		-	6.8	-	Α	
	IRRM	T <sub>J</sub> = 125 °C	$dI_F/dt = 500 \text{ A/}\mu\text{s}$ $V_R = 400 \text{ V}$	-	11	-	A
Reverse recovery charge Q <sub>rr</sub>	0	T <sub>J</sub> = 25 °C		-	140	-	nC
	T <sub>J</sub> = 125 °C		-	400	-	110	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-65	-	175	°C
Thermal resistance, junction to solder pad	R <sub>thJ-Sp</sub>		-	2.4	3.5	°C/W
Approximate weight				0.1		g
Approximate weight				0.0035		OZ.
Marking device		Case style TO-277A (SMPC)		NE	H6	

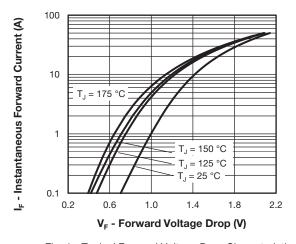


Fig. 1 - Typical Forward Voltage Drop Characteristics

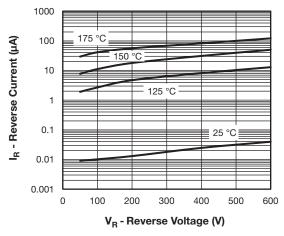


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

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## Vishay Semiconductors

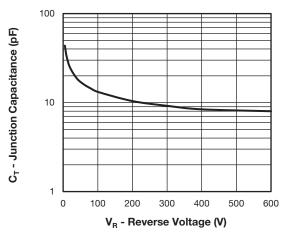


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

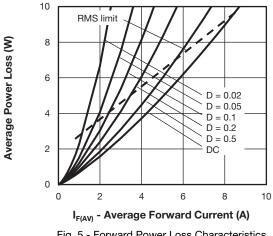


Fig. 5 - Forward Power Loss Characteristics

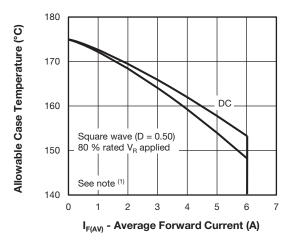


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

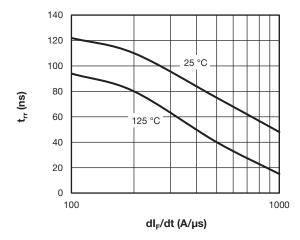


Fig. 6 - Typical Reverse Recovery Time vs. dl<sub>F</sub>/dt

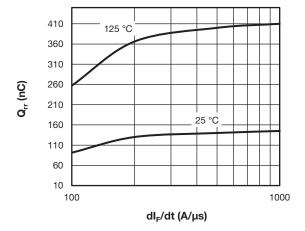
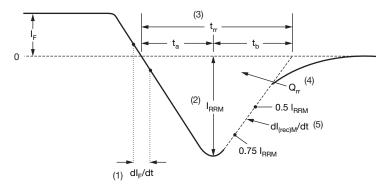


Fig. 7 - Typical Stored Charge vs. dl<sub>F</sub>/dt

#### Note

<sup>(1)</sup> Formula used:  $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$ ; Pd = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 5);  $Pd_{REV}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1}$  = rated  $V_R$ 



- (1) dl<sub>F</sub>/dt rate of change of current through zero crossing
- (2)  $I_{RRM}$  peak reverse recovery current
- (3)  $\rm t_{rr}$  reverse recovery time measured from zero crossing point of negative going  $\rm I_{r}$  to point where a line passing through 0.75  $\rm I_{RRM}$  and 0.50  $\rm I_{RRM}$  extrapolated to zero current.
- (4)  $\mathbf{Q}_{rr}$  area under curve defined by  $\mathbf{t}_{rr}$  and  $\mathbf{I}_{RRM}$

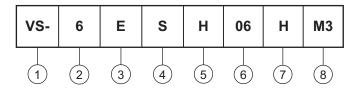
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) dl<sub>(rec)M</sub>/dt - peak rate of change of current during t<sub>b</sub> portion of t<sub>rr</sub>

Fig. 8 - Reverse Recovery Waveform and Definitions

#### **ORDERING INFORMATION TABLE**

### **Device code**



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

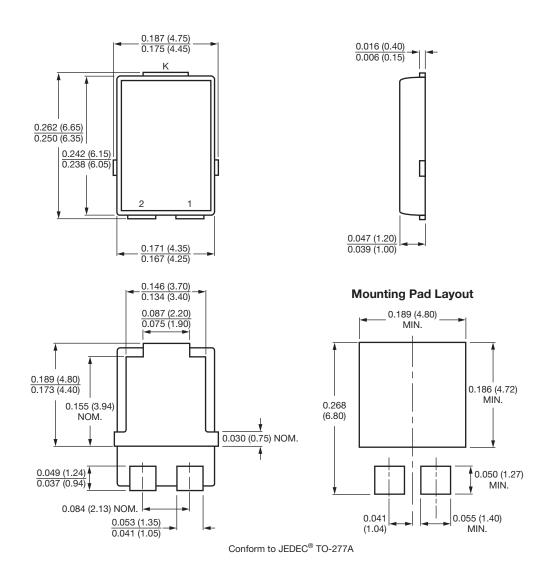
ORDERING INFORMATION (Example)					
PREFERRED P/N	QUANTITY PER REEL	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION		
VS-6ESH06HM3/86A	1500	1500	7" diameter plastic tape and reel		
VS-6ESH06HM3/87A	6500	6500	13" diameter plastic tape and reel		

LINKS TO RELATED DOCUMENTS				
Dimensions	www.vishay.com/doc?95570			
Part marking information	www.vishay.com/doc?95565			
Packaging information	www.vishay.com/doc?88869			



# **TO-277A (SMPC)**

### **DIMENSIONS** in inches (millimeters)





### **Legal Disclaimer Notice**

Vishay

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Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

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