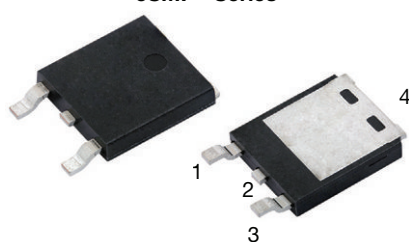


# Hyperfast Rectifier, 2 x 3 A FRED Pt®

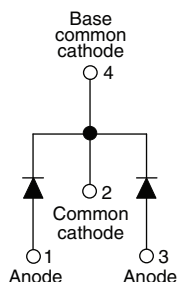


**RoHS**  
COMPLIANT  
HALOGEN  
FREE

eSMP® Series



SlimDPAK (TO-252AE)



## FEATURES

- Hyperfast recovery time
- Low forward voltage drop reduced  $Q_{rr}$  and soft recovery
- Low leakage current
- Very low profile - typical height of 1.3 mm
- 175 °C operating junction temperature
- Ideal for automated placement
- AEC-Q101 qualified, meets JESD 201 class 2 whisker test
- Polyimide passivation for high reliability standard
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

## DESCRIPTION / APPLICATIONS

State of the art hyper fast recovery rectifiers designed with optimized performance of forward voltage drop and hyper 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 stage in the AC/DC section of SMPS inverters or as freewheeling diodes. Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

## MECHANICAL DATA

**Case:** SlimDPAK (TO-252AE)

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

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

## LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2 x 3 A
$V_R$	200 V
$V_F$ at $I_F$	0.75 V
$t_{rr}$ (typ.)	20 ns
$T_J$ max.	175 °C
Package	SlimDPAK (TO-252AE)
Circuit configuration	Common cathode

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Peak repetitive reverse voltage	$V_{RRM}$		200	V
Average rectified forward current	$I_{F(AV)}$	Total device, rated $V_R$ , $T_C = 166$ °C	3	A
			6	
Non-repetitive peak surge current	$I_{FSM}$	$T_J = 25$ °C, 10 ms sine pulse wave	70	
Operating junction and storage temperatures	$T_J, T_{Stg}$		-55 to +175	°C

ELECTRICAL SPECIFICATIONS ( $T_J = 25$ °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	$V_{BR}, V_R$	$I_R = 100$ $\mu$ A	200	-	-	V
Forward voltage	$V_F$	$I_F = 3$ A	-	0.9	1.04	
		$I_F = 3$ A, $T_J = 150$ °C	-	0.75	0.82	
		$I_F = 6$ A	-	1	1.2	
		$I_F = 6$ A, $T_J = 150$ °C	-	0.85	1.01	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	-	5	$\mu$ A
		$T_J = 150$ °C, $V_R = V_R$ rated	-	-	80	
Junction capacitance	$C_T$	$V_R = 200$ V	-	12	-	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	$t_{rr}$	$I_F = 1.0\text{ A}$ , $dI_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	20	-	ns
		$I_F = 0.5\text{ A}$ , $I_R = 1\text{ A}$ , $I_{RR} = 0.25\text{ A}$	-	-	25	
		$T_J = 25\text{ }^{\circ}\text{C}$	-	17	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	26	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	1.8	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	3.2	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	15	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	41	-	

<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 to ambient	$R_{thJA}$ (1)(2)		-	75	90	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction to mount, per leg	$R_{thJM}$ (3)		-	3.2	4	$^{\circ}\text{C}/\text{W}$
Weight			-	0.20	-	g
Marking device		Case style SlimDPAK (TO-252AE)	6CVH02			

**Notes**

- (1) The heat generated must be less than thermal conductivity from junction-to-ambient;  $dP_D/dT_J < 1/R_{thJA}$   
(2) Free air, mounted or recommended copper pad area; thermal resistance  $R_{thJA}$  junction to ambient  
(3) Mounted on infinite heatsink

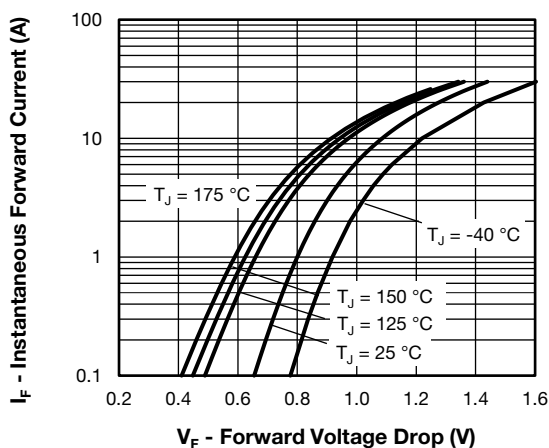


Fig. 1 - Typical Forward Voltage Drop Characteristics

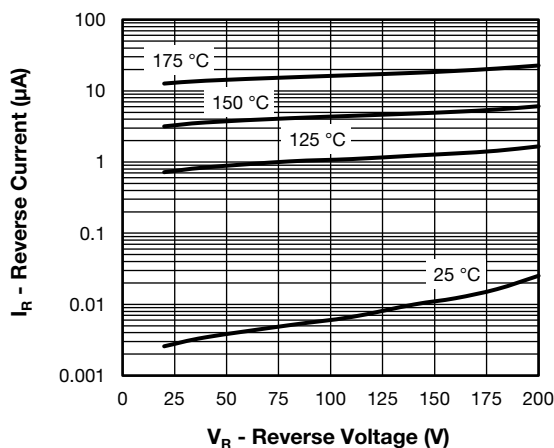


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

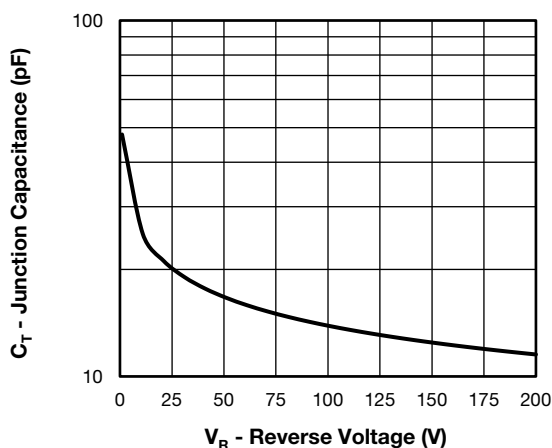


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

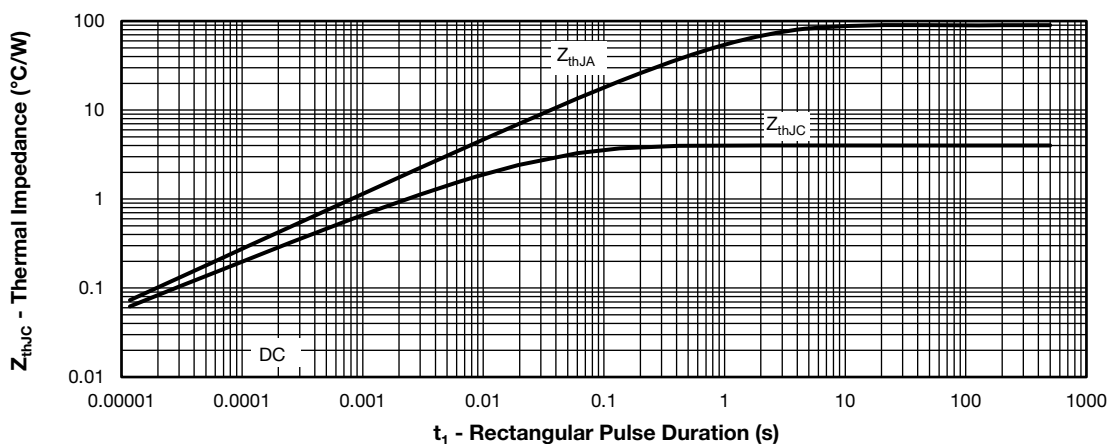
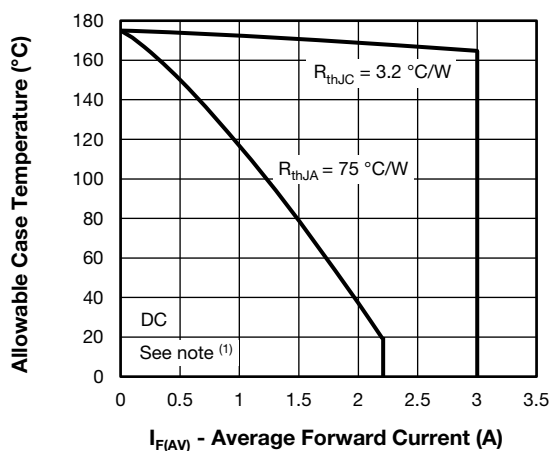

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


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

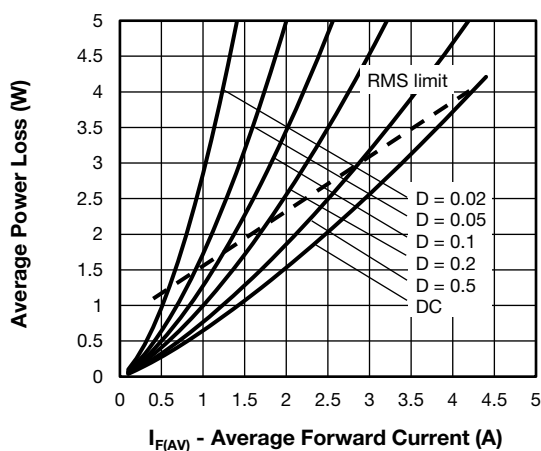


Fig. 6 - Forward Power Loss Characteristics

#### Note

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{dREV}$  = inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1}$  = rated  $V_R$

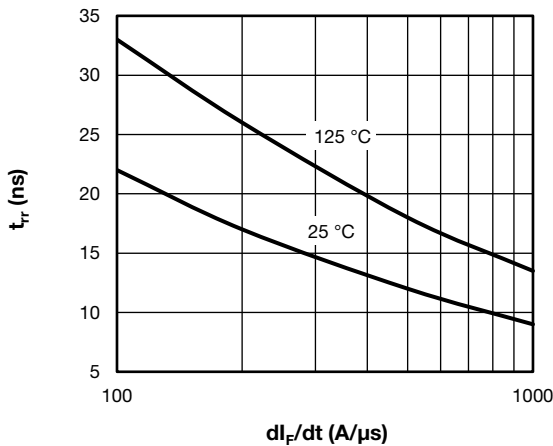
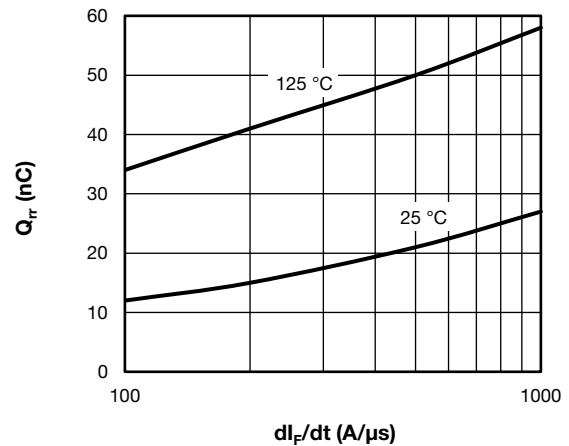
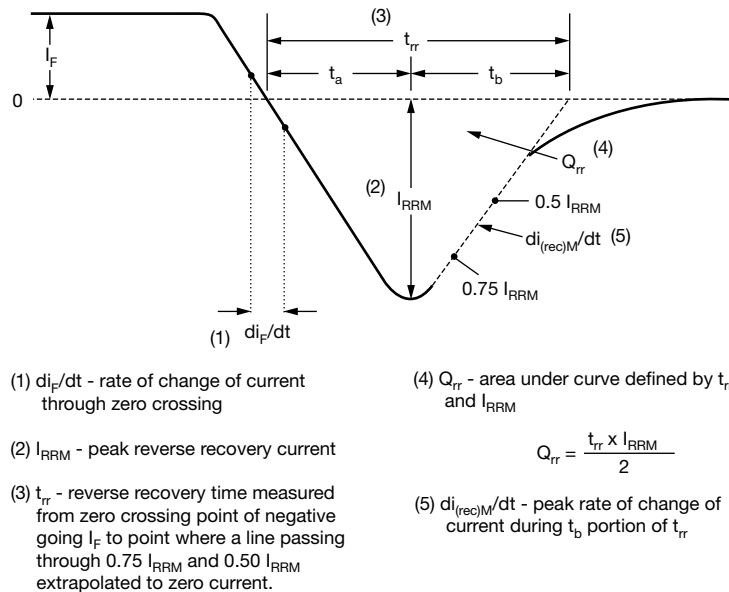

Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$ 

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>6</b>	<b>C</b>	<b>V</b>	<b>H</b>	<b>02</b>	<b>H</b>	<b>M3</b>
	①	②	③	④	⑤	⑥	⑦	⑧

- 1 - Vishay Semiconductors product
- 2 - Current rating (6 = 6 A)
- 3 - Circuit configuration:  
C = common cathode
- 4 - V = SlimDPAK
- 5 - Process type,  
H = hyper fast recovery
- 6 - Voltage code (02 = 200 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-6CVH02HM3/I	4500	4500	13" diameter plastic tape and reel

## LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?96081">www.vishay.com/doc?96081</a>
Part marking information	<a href="http://www.vishay.com/doc?96085">www.vishay.com/doc?96085</a>
Packaging information	<a href="http://www.vishay.com/doc?88869">www.vishay.com/doc?88869</a>



## SlimDPAK

**DIMENSIONS** in inches (millimeters)



### Mounting Pad Layout





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