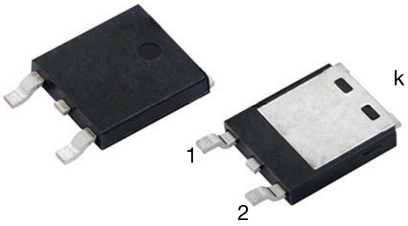
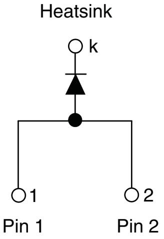
Hyperfast Rectifier, 4 A FRED Pt®

eSMP® Series





SlimDPAK (TO-252AE)

DESIGN SUPPORT TOOLS

click logo to get started

3D Models Available

FEATURES

AUTOMOTIVE GRADE Available

RoHS COMPLIANT

HALOGEN FREE

- Hyperfast recovery time
- 175 °C max. operating junction temperature
- Low forward voltage drop reduced Q_{rr} and soft recovery
- Low leakage current
- Very low profile - typical height of 1.3 mm
- Ideal for automated placement
- Polyimide passivation for high reliability standard
- 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.vishay.com/doc?99912

DESCRIPTION / APPLICATIONS

State of the art hyper fast recovery rectifiers 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.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	4 A
V_R	200 V
V_F at I_F	0.71 V
t_{rr} (typ.)	16 ns
T_J max.	175 °C
Package	SlimDPAK (TO-252AE)
Circuit configuration	Single

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		200	V
Average rectified forward current	$I_{F(AV)}$	T_C = 167 °C	4	A
Non-repetitive peak surge current	I_{FSM}	T_J = 25 °C	100	
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 μA	200	-	-	V
Forward voltage	V_F	I_F = 4 A	-	0.88	1.0	
		I_F = 4 A, T_J = 150 °C	-	0.71	0.80	
Reverse leakage current	I_R	V_R = V_R rated	-	-	3	μA
		T_J = 150 °C, V_R = V_R rated	-	-	80	
Junction capacitance	C_T	V_R = 200 V	-	17	-	pF

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time	t_{rr}	I_F = 1.0 A, dI_F/dt = 100 A/μs, V_R = 30 V		-	16	-	ns
		I_F = 0.5 A, I_R = 1 A, I_{RR} = 0.25 A		-	-	25	
		T_J = 25 °C	I_F = 4 A dI_F/dt = 200 A/μs V_R = 160 V	-	20	-	
		T_J = 125 °C		-	30	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	2.5	-	A
		T_J = 125 °C		-	4	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	25	-	nC
		T_J = 125 °C		-	60	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Maximum junction and storage temperature range	T_J, T_{Stg}		-55	-	175	°C
Thermal resistance, junction to ambient	R_{thJA} (1)(2)		-	73	90	°C/W
Thermal resistance, junction to case	R_{thJC} (3)		-	2.1	2.5	°C/W
Marking device		Case style SlimDPAK (TO-252AE)	4EVH02			

Notes

(1) The heat generated must be less than thermal conductivity from junction to ambient; $dP_D/dT_J < 1R_{thJA}$

(2) Free air, mounted or recommended copper pad area; thermal resistance R_{thJA} - junction to ambient

(3) Mounted on infinite heatsink

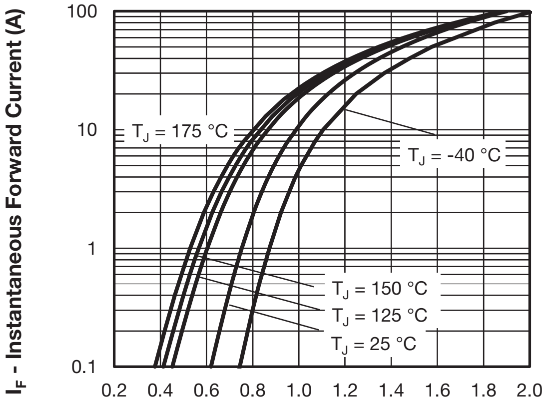


Fig. 1 - Typical Forward Voltage Drop Characteristics

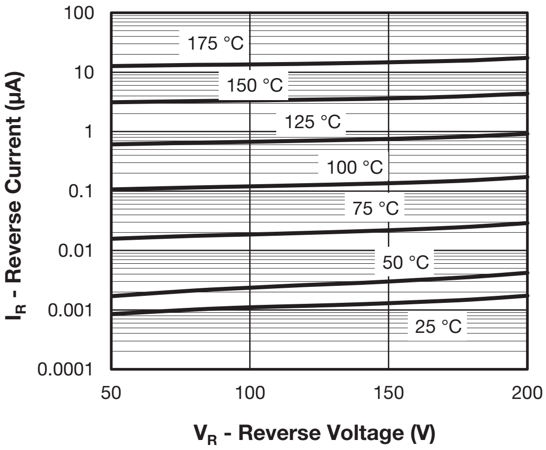


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

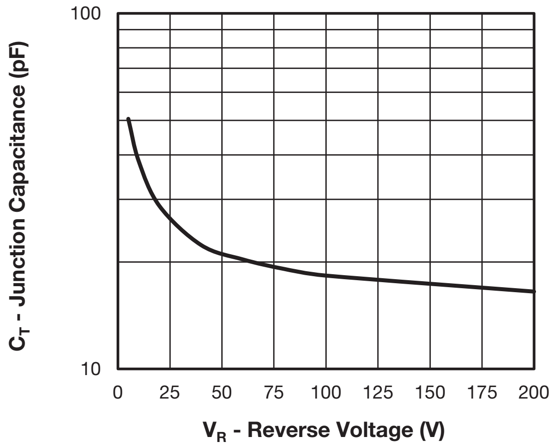


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

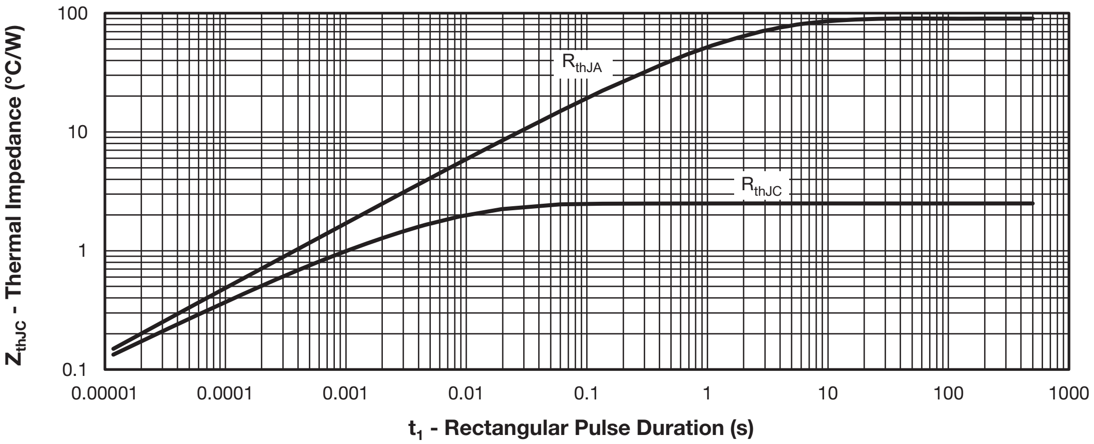


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

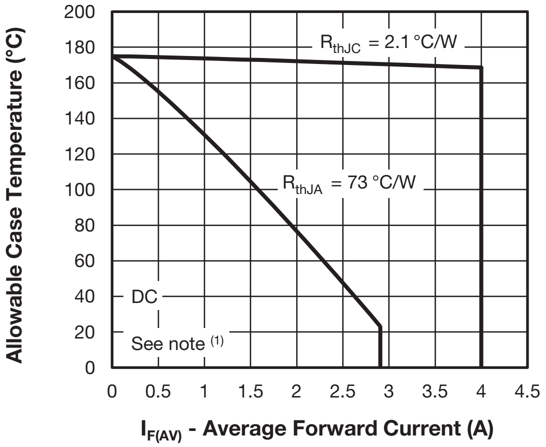


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

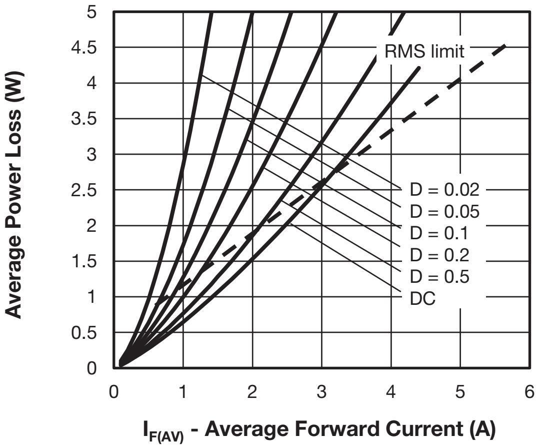


Fig. 6 - Forward Power Loss Characteristics

Note

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

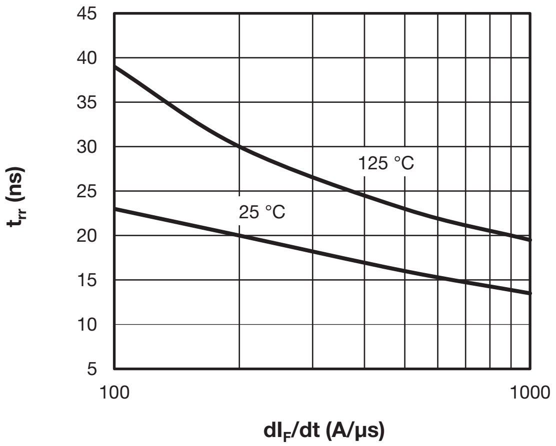


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

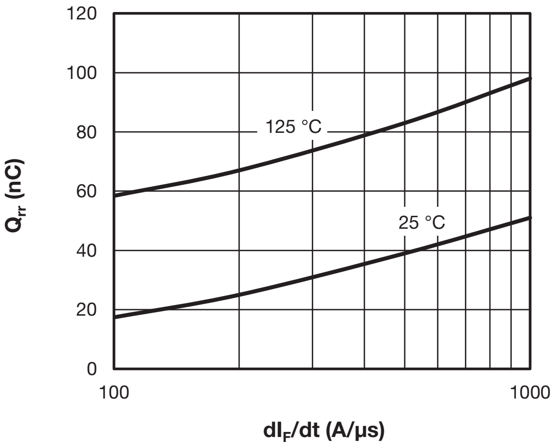
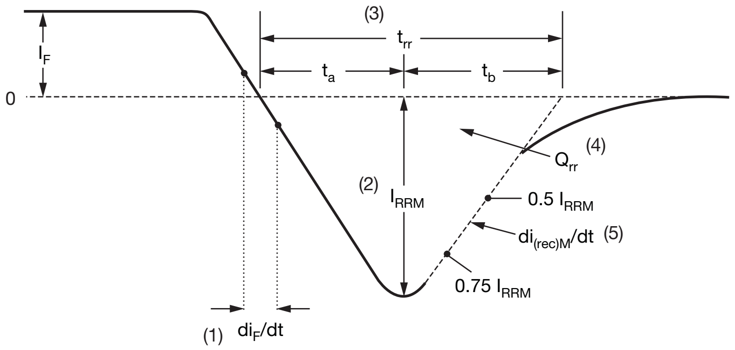


Fig. 8 - Typical Stored Charge vs. dI_F/dt



(1) di_F/dt - rate of change of current through zero crossing

(2) I_{RRM} - peak reverse recovery current

(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current.

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

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

(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 9 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code	**VS-**	**4**	**E**	**V**	**H**	**02**	**H**	**M3**
	①	②	③	④	⑤	⑥	⑦	⑧

1 - Vishay Semiconductors product
2 - Current rating (4 = 4 A)
3 - Circuit configuration:
E = single die
4 - V = SlimDPAK
5 - Process type:
H = hyper fast recovery
6 - Voltage code (02 = 200 V)
7 - H = AEC-Q101 qualified
8 - Environmental digit:
M3 = halogen-free, RoHS compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)

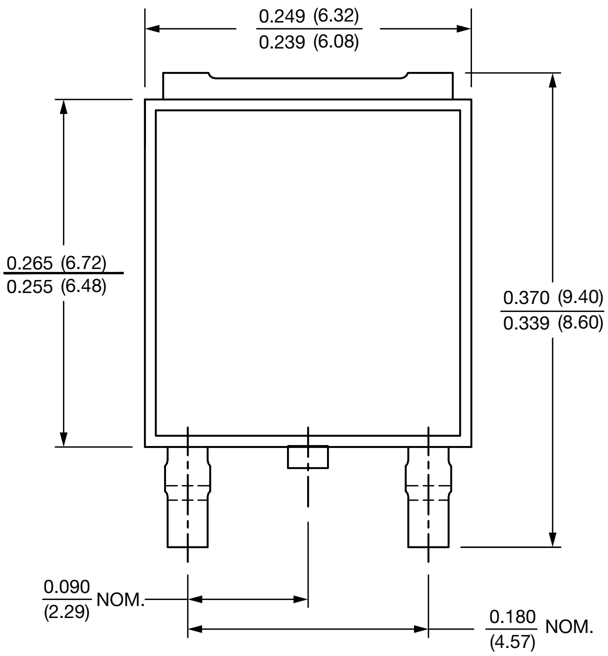
PREFERRED P/N	**QUANTITY PER REEL**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-4EVH02HM3/I	4500	4500	13"diameter plastic tape and reel

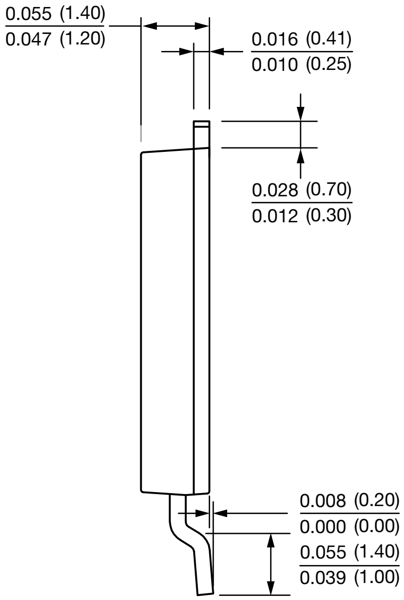
LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96081
Part marking information	www.vishay.com/doc?96085
Packaging information	www.vishay.com/doc?88869

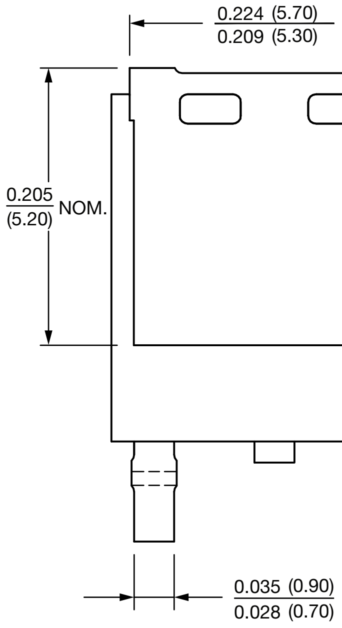
SlimDPAK

DIMENSIONS in inches (millimeters)

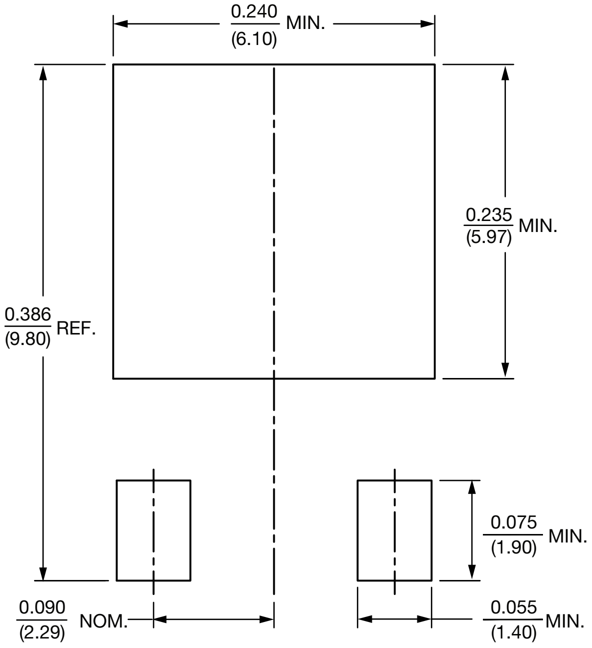
SlimDPAK







Mounting Pad Layout



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