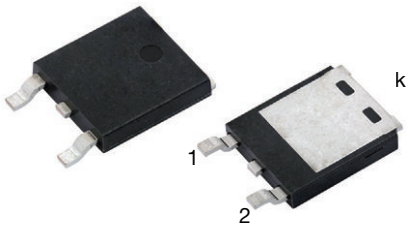
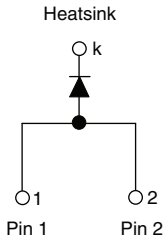
Ultralow V_F Ultrafast Rectifier, 6 A FRED Pt®

eSMP® Series



SlimDPAK (TO-252AE)



FEATURES

- Ultrafast recovery time, extremely low V_F and soft recovery
- For PFC CCM operation
- Low forward voltage drop, low power losses
- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Meets JESD 201 class 2 whisker test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	6 A
V_R	600 V
V_F at I_F	0.98 V
t_{rr} (typ.)	34 ns
T_J max.	175 °C
Package	SlimDPAK (TO-252AE)
Circuit configuration	Single

TYPICAL APPLICATIONS

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

Base PN/-M3 - 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_C = 158 °C	6	A
Non-repetitive peak surge current	I_{FSM}	T_J = 25 °C, 10 ms sine pulse wave	80	
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	600	-	-	V
Forward voltage	V_F	I_F = 6 A	-	1.15	1.35	
		I_F = 6 A, T_J = 150 °C	-	0.98	1.15	
Reverse leakage current	I_R	V_R = V_R rated	-	-	5	μA
		T_J = 150 °C, V_R = V_R rated	-	-	125	
Junction capacitance	C_T	V_R = 600 V	-	10	-	pF

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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 A, dI_F/dt = 50 A/μs, V_R = 30 V		-	45	-	ns
		I_F = 1 A, dI_F/dt = 100 A/μs, V_R = 30 V		-	34	-	
		I_F = 0.5 A, I_R = 1 A, I_{RR} = 0.25 A		-	-	50	
		T_J = 25 °C	I_F = 6 A dI_F/dt = 500 A/μs V_R = 400 V	-	65	-	
		T_J = 125 °C		-	90	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	9.5	-	A
		T_J = 125 °C		-	13.5	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	320	-	nC
		T_J = 125 °C		-	620	-	

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 mount	R_{thJM}		-	-	2.5	°C/W
Weight			-	0.20	-	g
Marking device		Case style SlimDPAK (TO-252AE)	6EVL06			

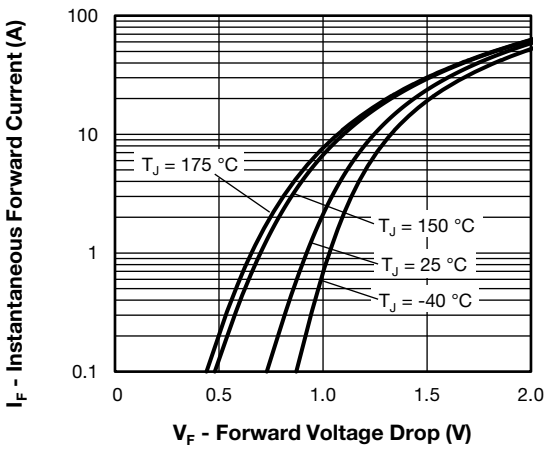

Fig. 1 - Typical Forward Voltage Drop Characteristics

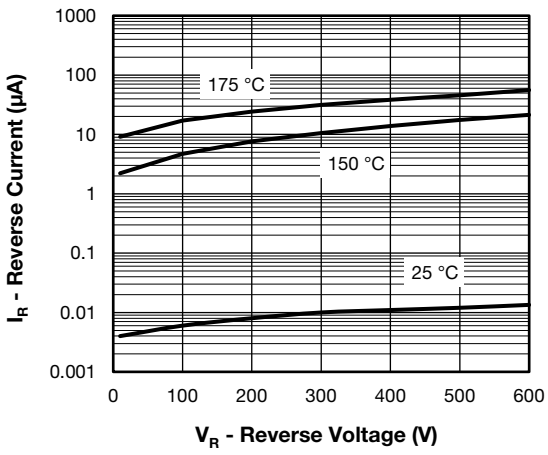

Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

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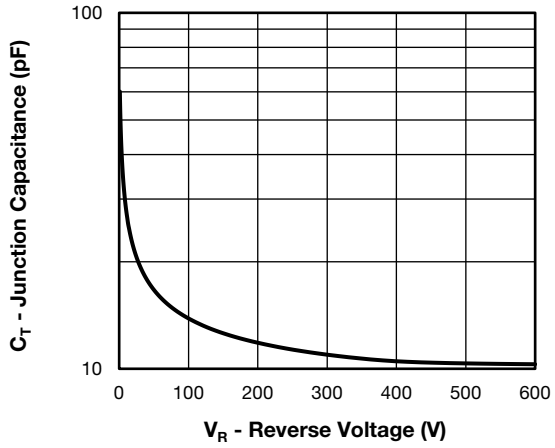

Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

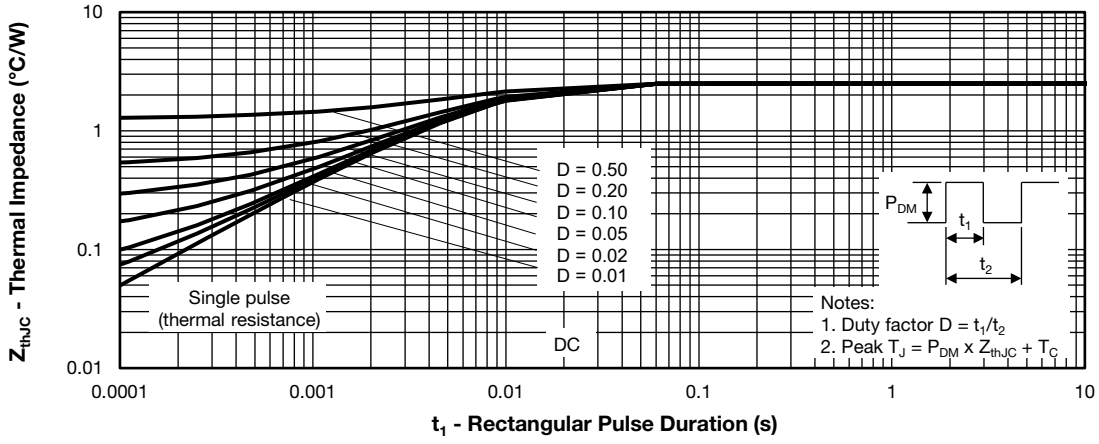

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

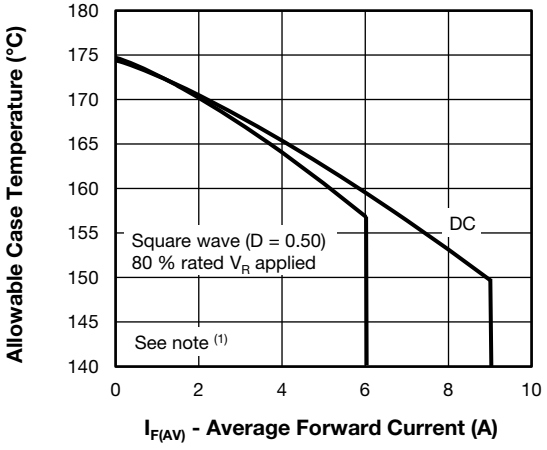

Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

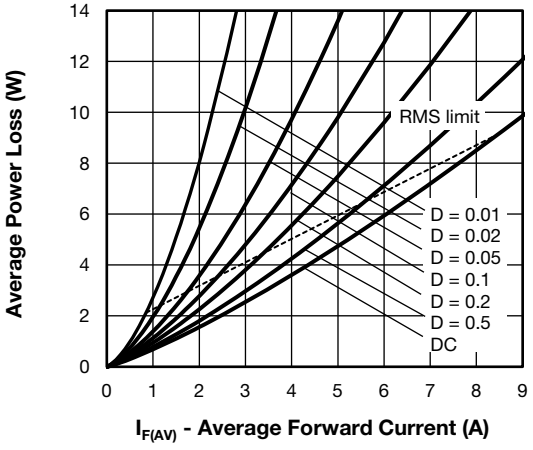

Fig. 6 - Forward Power Loss Characteristics

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

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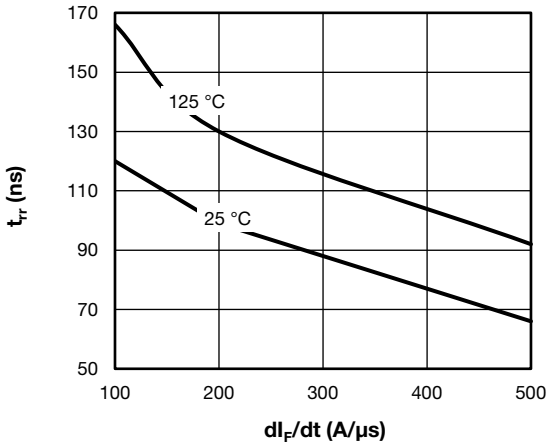


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

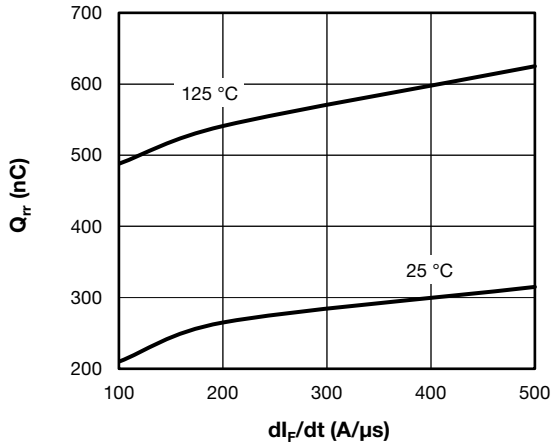
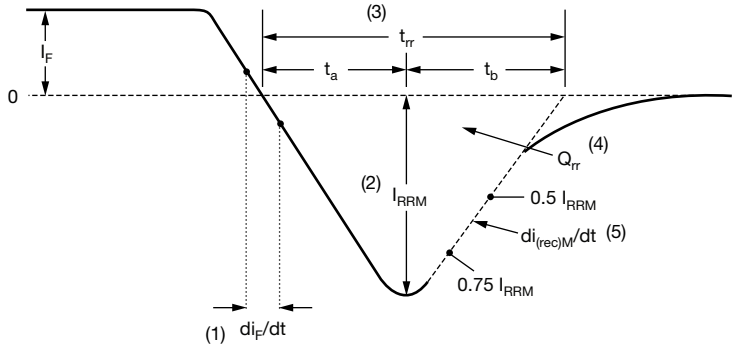


Fig. 8 - Typical Stored Charge vs. dI_F/dt



(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

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ORDERING INFORMATION TABLE

Device code	VS-	6	E	V	L	06	-M3
	1	2	3	4	5	6	7

1 - Vishay Semiconductors product

2 - Current rating (6 = 6 A)

3 - Circuit configuration:
E = single die

4 - V = SlimDPAK

5 - Process type:
L = ultralow V_F ultrafast rectifier

6 - Voltage code (06 = 600 V)

7 - Environmental digit:
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)				
PREFERRED P/N	**UNIT WEIGHT (g)**	**PREFERRED PACKAGE CODE**	**BASE QUANTITY**	**PACKAGING DESCRIPTION**
VS-6EVL06-M3/I	0.20	I	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

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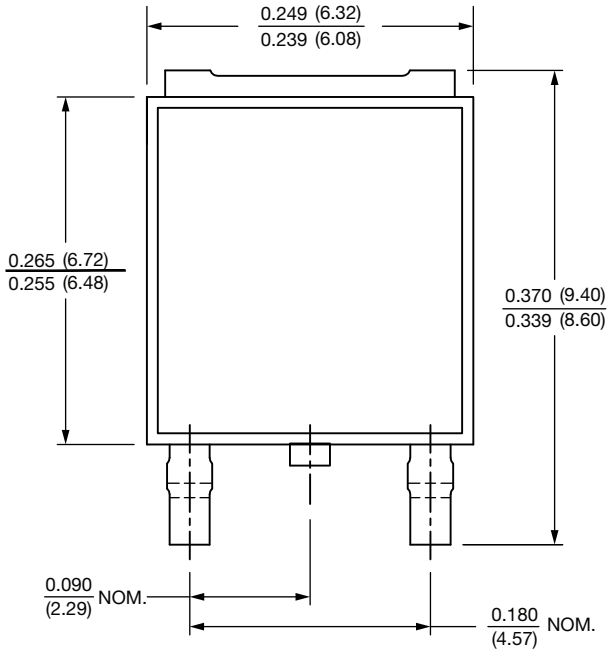
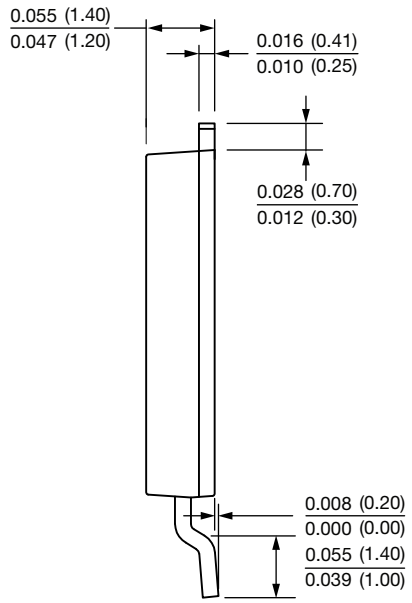
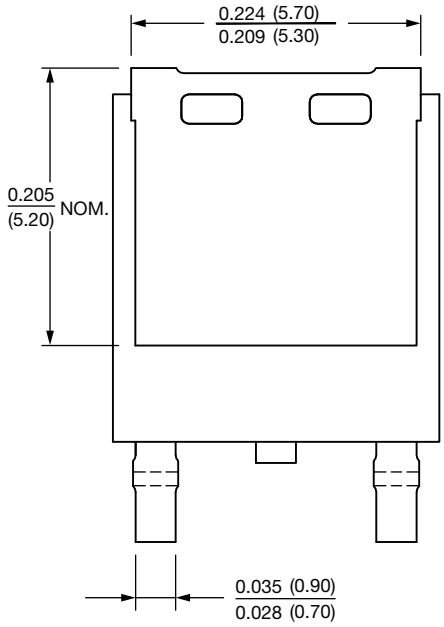
SlimDPAK

DIMENSIONS in inches (millimeters)

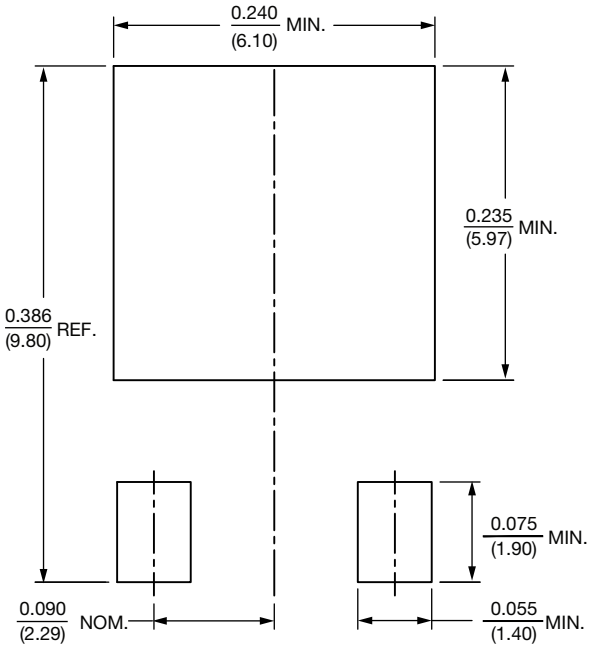
SlimDPAK







Mounting Pad Layout



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