

Ultrafast Rectifier, 6 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
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT
HALOGEN
FREE

LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS

$I_{F(AV)}$	6 A
V_R	600 V
V_F at I_F	0.95 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	$I_{F(AV)}$	$T_{Sp} = 150$ °C	6	A
Non-repetitive peak surge current	I_{FSM}	$T_J = 25$ °C	120	
Operating junction and storage temperatures	T_J, T_{Stg}		-65 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	$I_R = 100$ μ A	600	-	-	V
Forward voltage	V_F	$I_F = 6$ A	-	1.10	1.30	
		$I_F = 6$ A, $T_J = 150$ °C	-	0.95	1.15	
Reverse leakage current	I_R	$V_R = V_R$ rated	-	-	5	μ A
		$T_J = 150$ °C, $V_R = V_R$ rated	-	25	150	
Junction capacitance	C_T	$V_R = 600$ V	-	8	-	pF

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	$I_F = 1\text{ A}$, $di_F/dt = 50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	42	-	ns
		$I_F = 0.5\text{ A}$, $I_R = 1\text{ A}$, $I_{rr} = 0.25\text{ A}$	-	-	60	
		$T_J = 25\text{ }^{\circ}\text{C}$	-	58	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	85	-	
Peak recovery current	I_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$	-	10	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	15	-	
Reverse recovery charge	Q_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	-	290	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	620	-	

THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J , T_{Stg}		-65	-	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
			0.0035			oz.
Marking device		Case style SMPC (TO-277A)	NEU6			

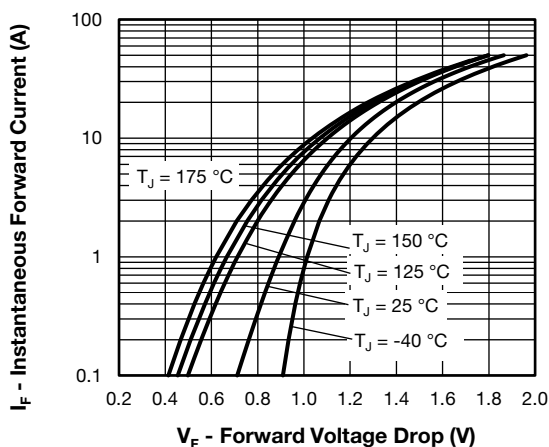


Fig. 1 - Typical Forward Voltage Drop Characteristics

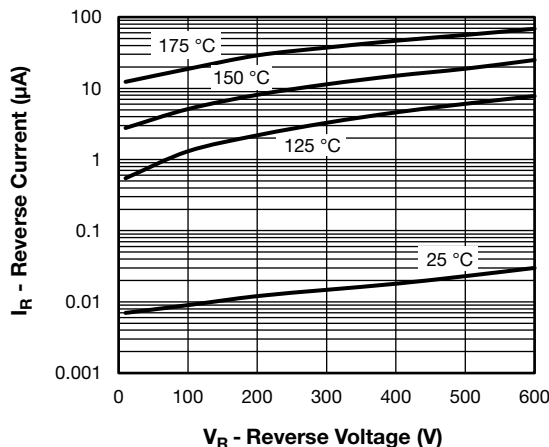


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

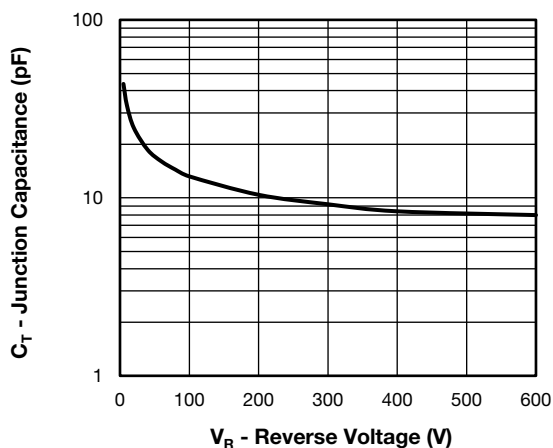


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

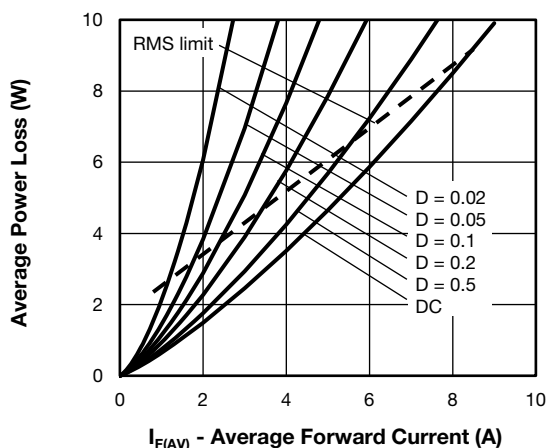


Fig. 5 - Forward Power Loss Characteristics

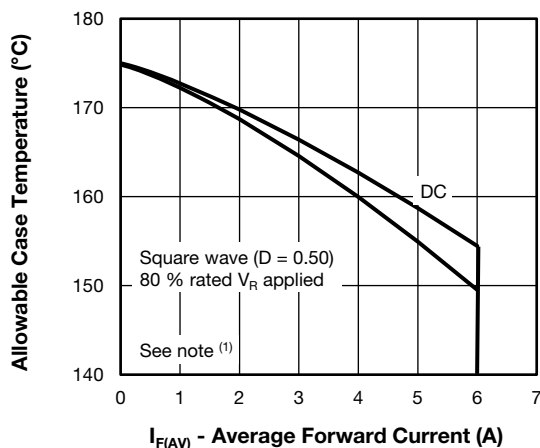
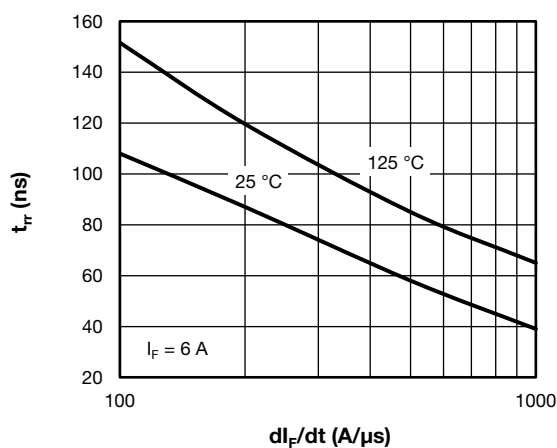
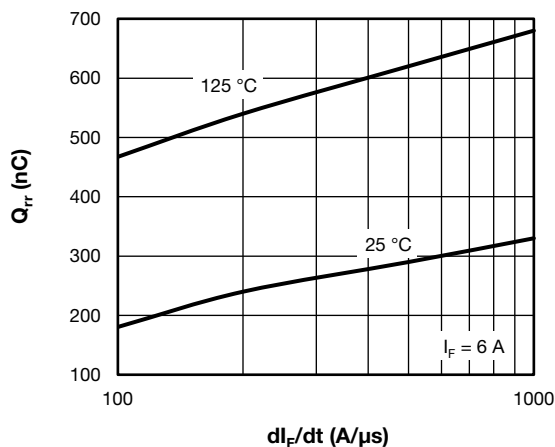


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current


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

Fig. 7 - Typical Stored Charge 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

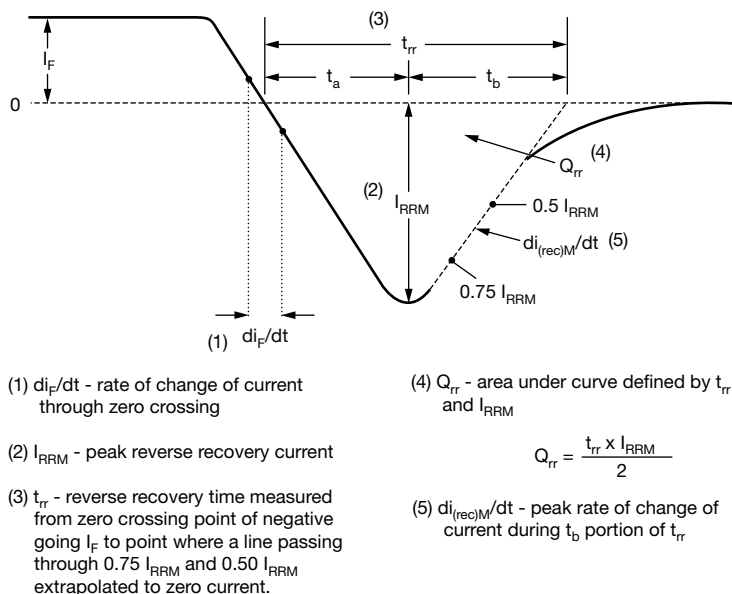


Fig. 8 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code	VS-	6	E	S	U	06	-M3
	1	2	3	4	5	6	7

- 1** - Vishay Semiconductors product
- 2** - Current rating (6 = 6 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** - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)

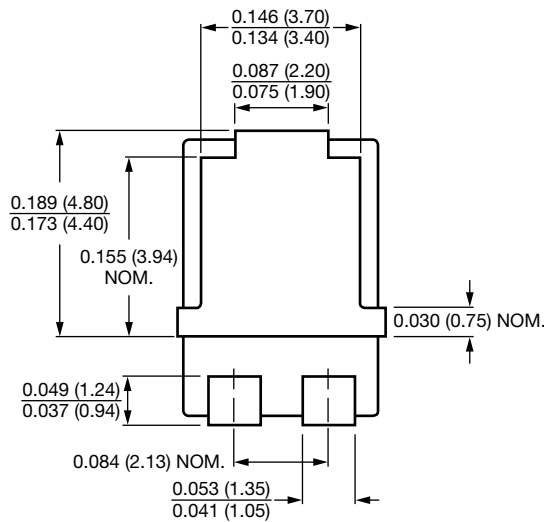
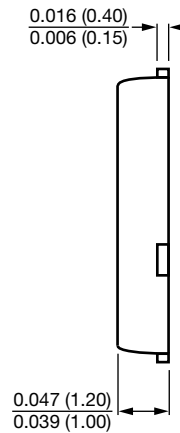
PREFERRED P/N	QUANTITY PER REEL	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-6ESU06-M3/86A	1500	1500	7" diameter plastic tape and reel
VS-6ESU06-M3/87A	6500	6500	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS

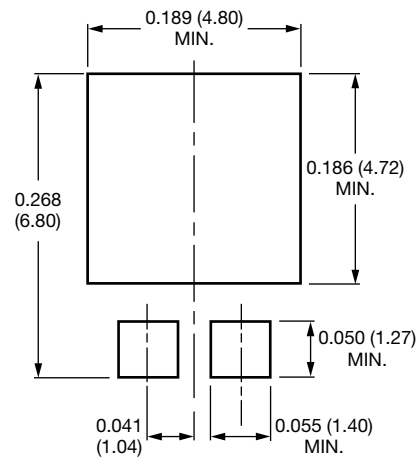
Dimensions	www.vishay.com/doc?95570
Part marking information	www.vishay.com/doc?95565
Packaging information	www.vishay.com/doc?88869
SPICE model	www.vishay.com/doc?96703

SMPC (TO-277A)

DIMENSIONS in inches (millimeters)



Mounting Pad Layout



Conform to JEDEC® TO-277A



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