

Ultrafast Rectifier, 1 A FRED Pt[®]

eSMP[®] Series

SMP (DO-220AA)

Cathode Anode


RoHS
COMPLIANT
HALOGEN
FREE
FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Low forward voltage drop, low power losses
- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- For PFC, CRM snubber operation
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

TYPICAL APPLICATIONS

For use in high frequency, freewheeling, DC/DC converters, PFC, and in snubber industrial and automotive applications.

MECHANICAL DATA
Case: SMP (DO-220AA)

Molding compound meets UL 94 V-0 flammability rating

Terminals: matte tin plated leads, solderable per J-STD-002, meets JESD 201 class 2 whisker test

Polarity: color band denotes cathode end

LINKS TO ADDITIONAL RESOURCES


PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	1 A
V_R	100 V, 200 V
V_F at I_F	0.69 V
I_{FSM}	40 A
t_{rr} (typ.)	23 ns
T_J max.	175 °C
Package	SMP (DO-220AA)
Circuit configuration	Single

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Peak repetitive reverse voltage	VS-1ENH01-M3	V_{RRM}		100	V
	VS-1ENH02-M3			200	
Average rectified forward current	$I_{F(AV)}$	$T_C = 168$ °C	1	A	
Non-repetitive peak surge current	I_{FSM}	$T_J = 25$ °C, 10 ms sine pulse	40		
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	VS-1ENH01-M3	V_{BR}, V_R	$I_R = 100$ μ A	100	-	-	V
	VS-1ENH02-M3			200	-	-	
Forward voltage	V_F	$I_F = 1$ A	-	0.86	0.92		
		$I_F = 1$ A, $T_J = 150$ °C	-	0.69	0.74		
Reverse leakage current	I_R	$V_R = V_R$ rated	-	-	2	μ A	
		$T_J = 150$ °C, $V_R = V_R$ rated	-	-	20		
Junction capacitance	C_T	$V_R = 200$ V	-	8	-	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	-	23	-	ns
		I _F = 0.5 A, I _R = 1 A, I _{rr} = 0.25 A	-	-	28	
		T _J = 25 °C	-	14	-	
		T _J = 125 °C	-	22	-	
Peak recovery current	I _{RRM}	T _J = 25 °C	-	1.7	-	A
		T _J = 125 °C	-	2.7	-	
Reverse recovery charge	Q _{rr}	T _J = 25 °C	-	10	-	nC
		T _J = 125 °C	-	29	-	

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 mount	R _{thJM} ⁽¹⁾	Infinite heatsink	-	7	9	°C/W
Thermal resistance, junction to ambient	R _{thJA}	PCB footprint 4.8 mm x 4.8 mm	-	107	-	
Approximate weight			0.024			g
Marking device	VS-1ENH01-M3	Case style SMP (DO-220AA)	1H1			
	VS-1ENH02-M3		1H2			

Note

(1) Thermal resistance junction to mount follows JEDEC® 51-14 transient dual interface test method (TDIM)

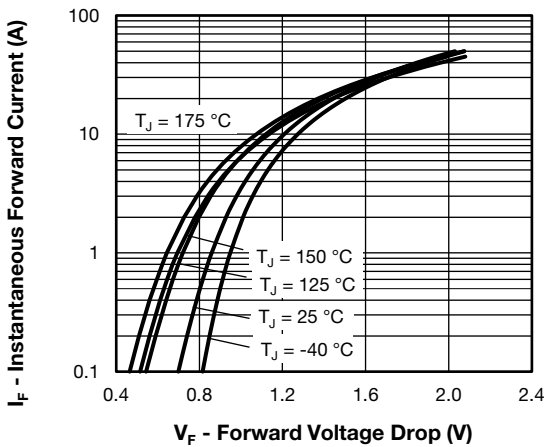


Fig. 1 - Typical Forward Voltage Drop Characteristics

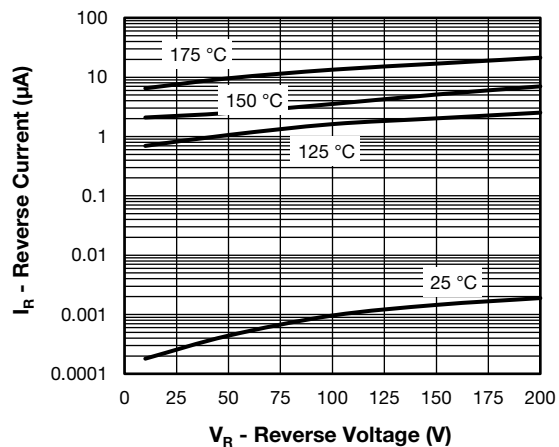


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

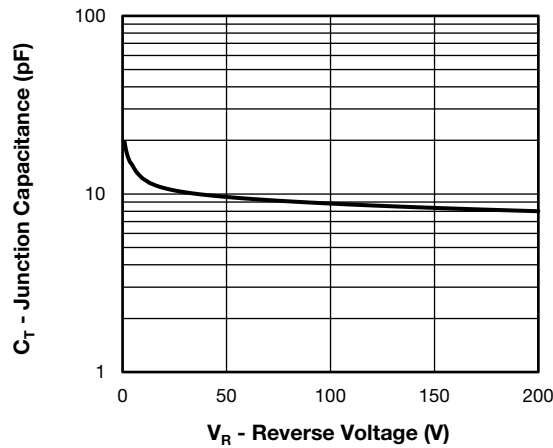


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

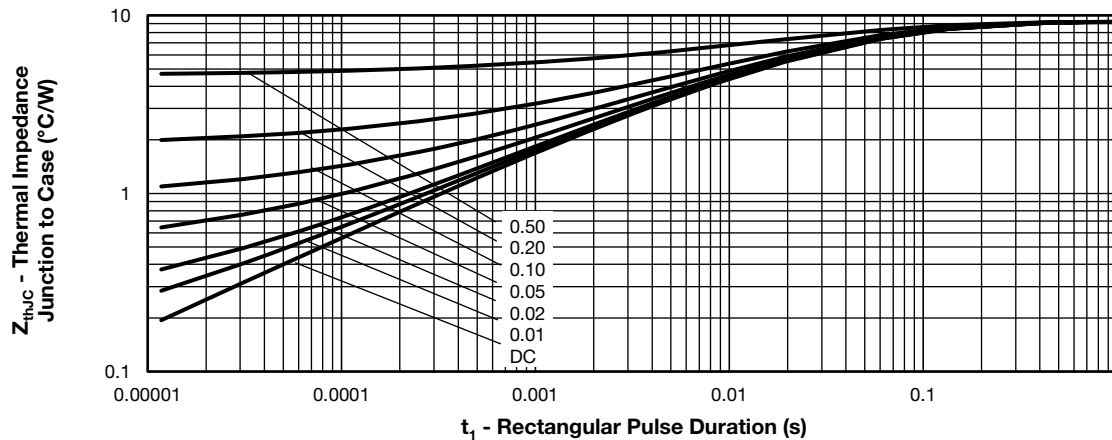


Fig. 4 - Transient Thermal Impedance, Junction to Case

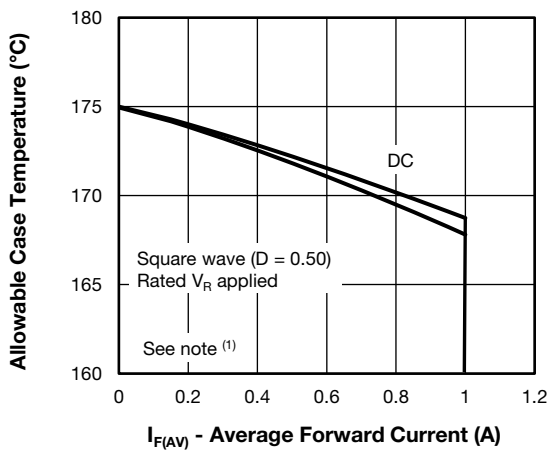


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

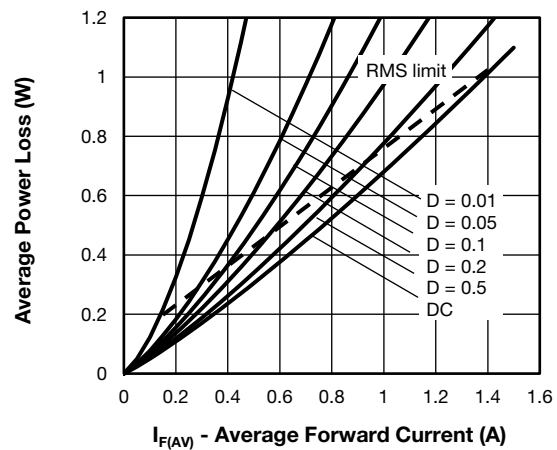


Fig. 6 - Forward Power Loss Characteristics

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. 5);
 P_{dREV} = inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = rated V_R

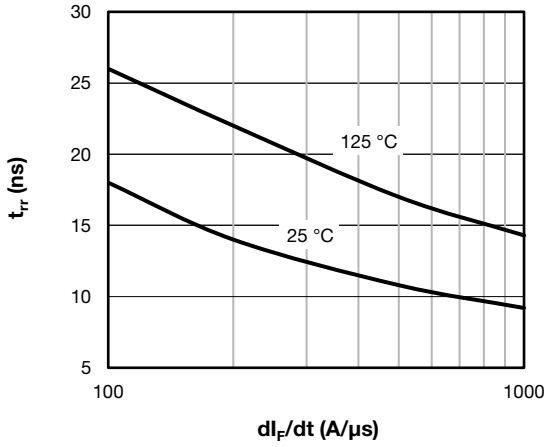


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

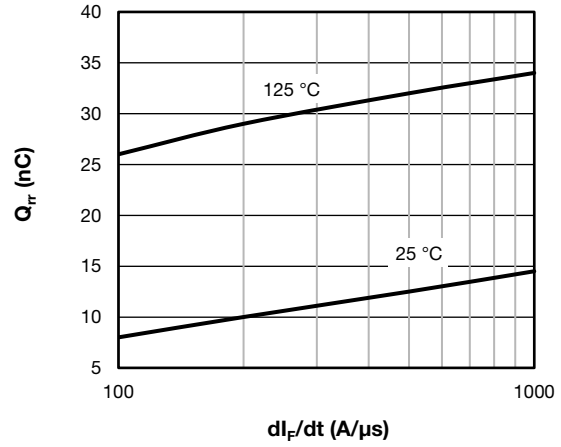
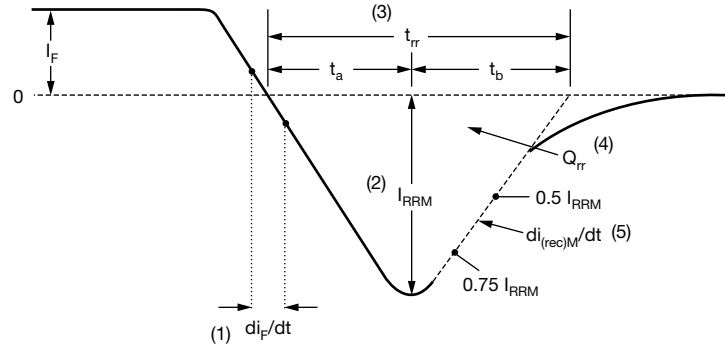


Fig. 8 - Typical Stored Charge vs. di_F/dt



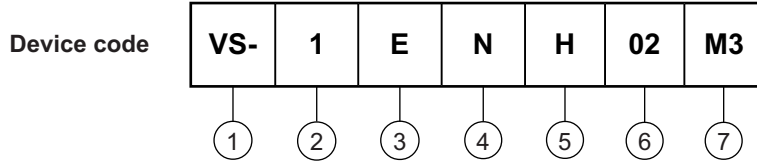
- (1) di_F/dt - rate of change of current through zero crossing
- (2) I_{RRM} - peak reverse recovery current
- (3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through $0.75 I_{RRM}$ and $0.50 I_{RRM}$ extrapolated to zero current.
- (4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}
- (5) $di_{(rec)M'}/dt$ - peak rate of change of current during t_b portion of t_{rr}

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

Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (1 = 1 A)
- 3** - Circuit configuration:
E = single diode
- 4** - N = SMP package
- 5** - Process type,
H = ultrafast recovery
- 6** - Voltage code (02 = 200 V)
- 7** - M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

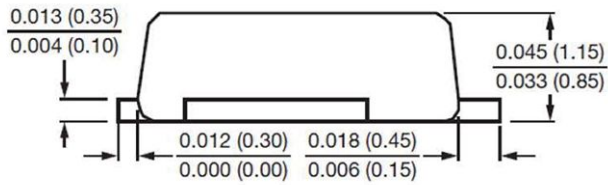
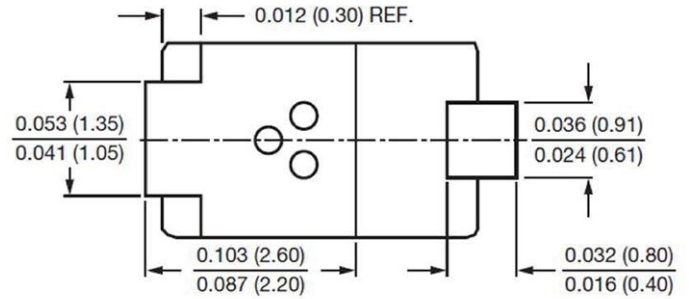
ORDERING INFORMATION (Example)			
PREFERRED P/N	PREFERRED PACKAGE CODE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-1ENH01-M3/84A	84A	3000	7" diameter plastic tape and reel
VS-1ENH01-M3/85A	85A	10 000	13" diameter plastic tape and reel
VS-1ENH02-M3/84A	84A	3000	7" diameter plastic tape and reel
VS-1ENH02-M3/85A	85A	10 000	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96547
Part marking information	www.vishay.com/doc?96574
Packaging information	www.vishay.com/doc?88869
SPICE model	www.vishay.com/doc?96550



SMP (DO-220AA)

DIMENSIONS in inches (millimeters)



Mounting pad layout:





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