Ultrafast Rectifier, 1 A FRED Pt®

eSMP® Series

SMP (DO-220AA)

Cathode ○—|◀—○ Anode

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

RoHS COMPLIANT

HALOGEN FREE

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

3D Models

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 µA	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	µA
			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	I_F = 1 A dI_F/dt = 200 A/µs V_R = 100 V	-	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)

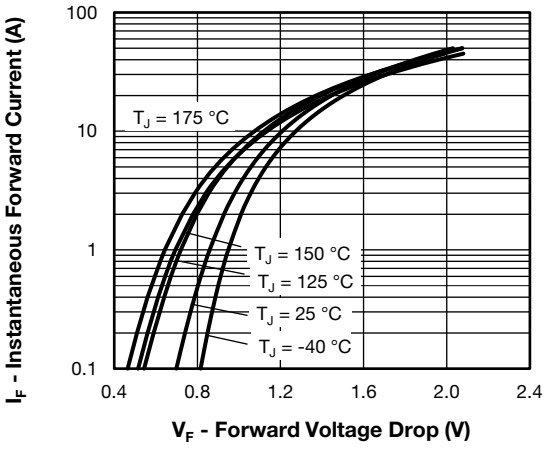


Fig. 1 - Typical Forward Voltage Drop Characteristics

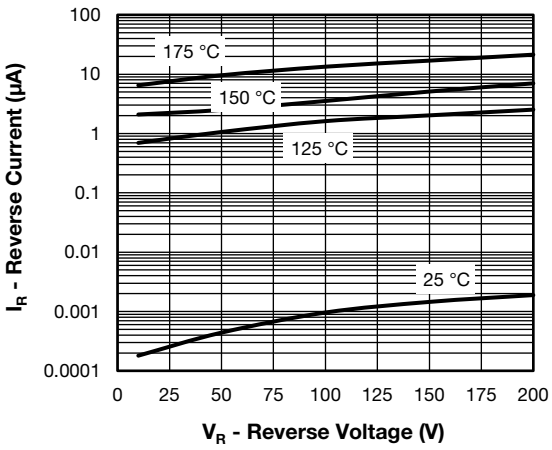


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

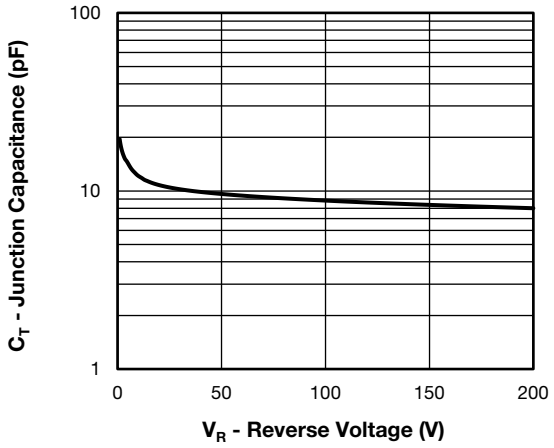


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

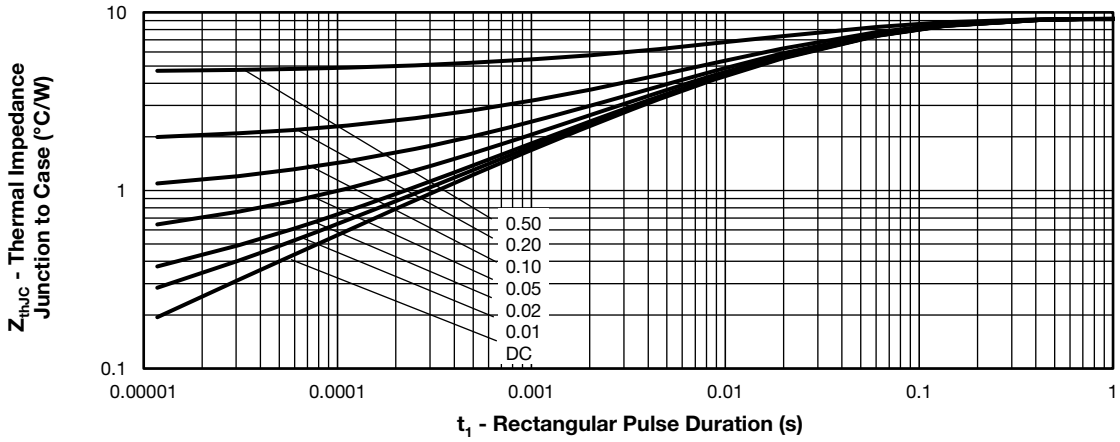


Fig. 4 - Transient Thermal Impedance, Junction to Case

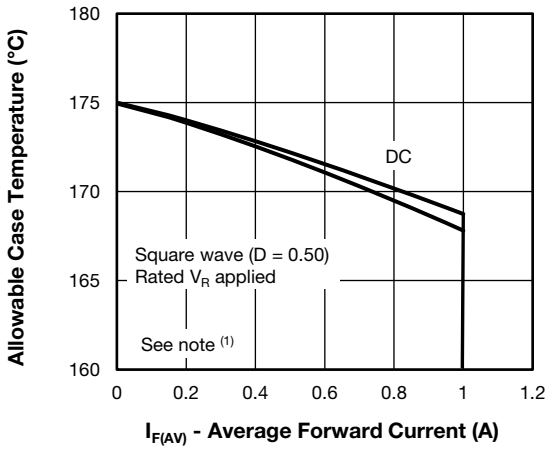


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

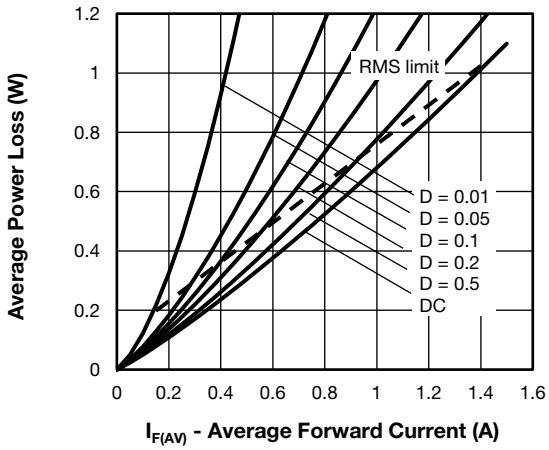


Fig. 6 - Forward Power Loss Characteristics

Note

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D) (see fig. 5);
Pd_{REV} = inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = rated V_R

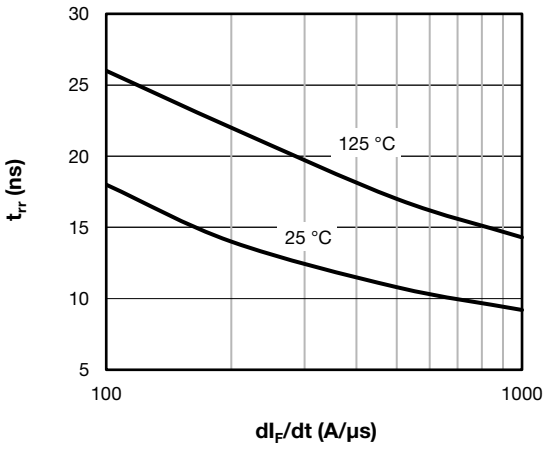


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

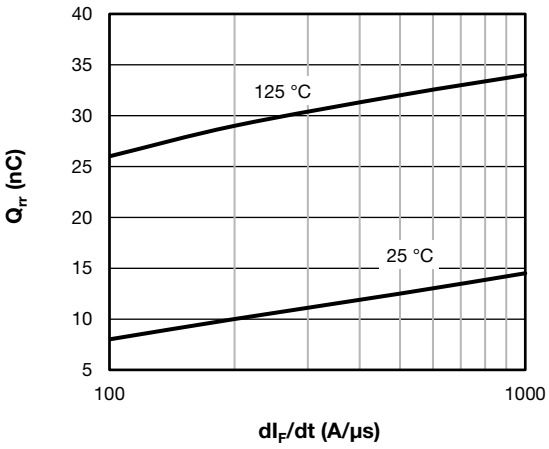
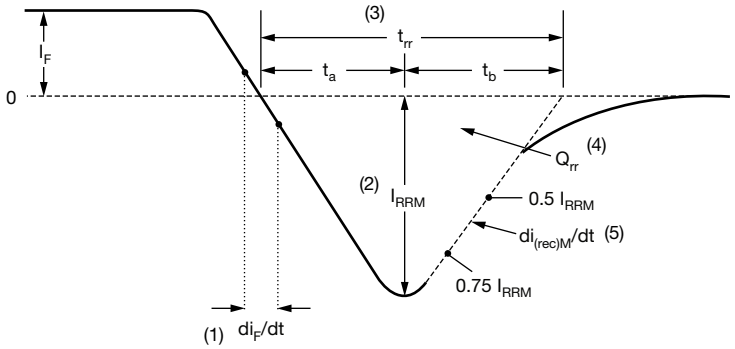


Fig. 8 - Typical Stored Charge vs. dI_F/dt



(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}

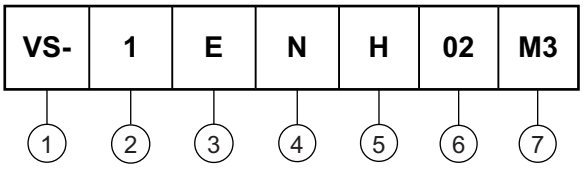
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(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



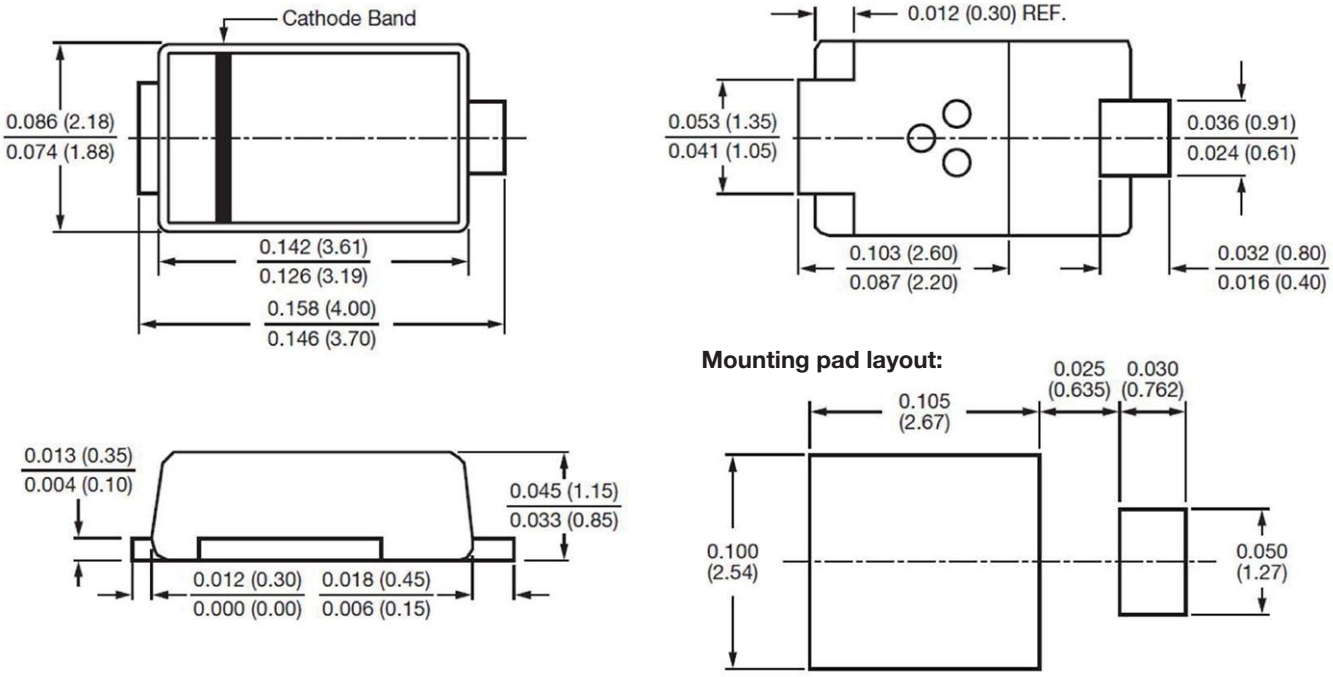
1 - Vishay Semiconductors product
2 - Current rating (1 = 1 A)
3 - Circuit configuration:
E = single diode
4 - N = SMP package
5 - Process type,
H = ultrafast recovery
6 - Voltage code (02 = 200 V)
7 - M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

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)



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