Hyperfast Rectifier, 1 A FRED Pt®

eSMP® Series
SMF (DO-219AB)

Top view Bottom view

Cathode  Anode

LINKS TO ADDITIONAL RESOURCES

3D Models
Application Notes

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	1 A
V_R	1200 V
V_F at I_F	1.45 V
t_{rr}	50 ns
T_J max.	175 °C
Package	SMF (DO-219AB)
Circuit configuration	Single

FEATURES

AUTOMOTIVE GRADE

RoHS COMPLIANT

HALOGEN FREE

- Hyperfast recovery time, reduced Q_{rr}, and soft recovery
- 175 °C maximum operating junction temperature
- Specified for output and 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

DESCRIPTION / APPLICATIONS

State of the art hyperfast recovery rectifiers specifically designed with optimized performance of forward voltage drop and hyperfast 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 as clamp, snubber and freewheeling diode in a flyback aux power supplies, bootstrap and desaturate for HV MOSFET and IGBT driver, high frequency rectifiers in a cuk and sepic circuit for LED lighting.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce power dissipation in the switching element.

MECHANICAL DATA

Case: SMF (DO-219AB)

Molding compound meets UL 94 V-0 flammability rating

Terminals: matte tin plated leads, solderable per J-STD-002

Polarity: color band denotes cathode end

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		1200	V
Average rectified forward current	$I_{F(AV)}$	T_{Sp} = 135 °C, DC conduction	1	A
Non-repetitive peak surge current	I_{FSM}	T_J = 25 °C, 8.3 ms sine pulse	14	
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	1200	-	-	V
Forward voltage, per diode	V_F	I_F = 1 A	-	1.85	2.30	
		I_F = 1 A, T_J = 125 °C	-	1.55	1.75	
		I_F = 1 A, T_J = 150 °C	-	1.45	1.65	
Reverse leakage current, per diode	I_R	V_R = V_R rated	-	-	2	μA
		T_J = 125 °C, V_R = V_R rated	-	-	20	
Junction capacitance	C_T	V_R = 1200 V	-	3.0	-	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 = 0.5 A, I_R = 1 A, I_{rr} = 0.25 A		-	40	50	ns
		T_J = 25 °C	I_F = 1 A, dI_F/dt = 200 A/μs, V_R = 800 V	-	91	-	
		T_J = 125 °C		-	120	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	3.0	-	A
		T_J = 125 °C		-	4.0	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	105	-	nC
		T_J = 125 °C		-	200	-	

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} (1)	Device mounted on PCB with 2 x 3.5 mm soldering lands	-	23	26	°C/W
Thermal resistance, junction to ambient	R_{thJA}	Device mounted on PCB with recommended pad size	-	125	-	°C/W
Approximate weight				0.015		g
Marking device		Case style SMF (DO-219AB)		MRX		

Note

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

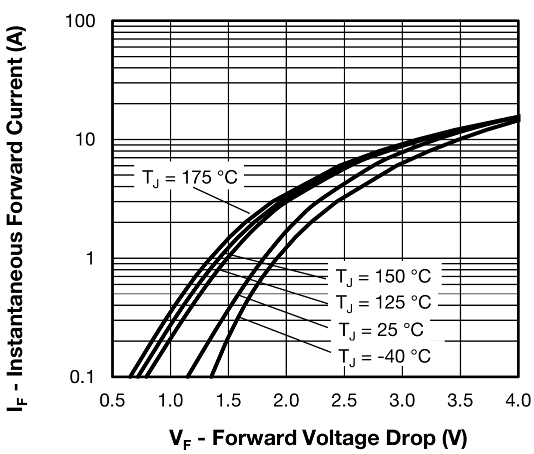


Fig. 1 - Typical Forward Voltage Drop Characteristics

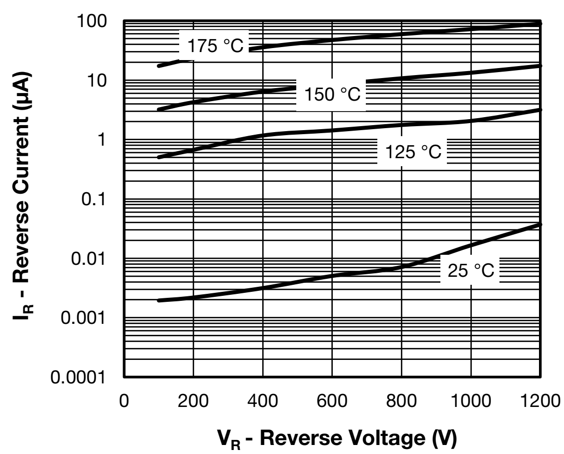


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

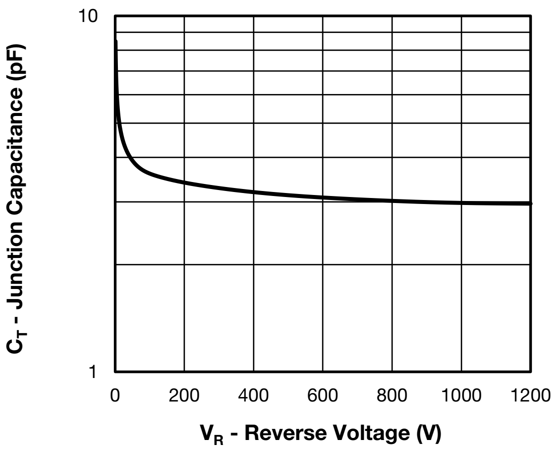


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

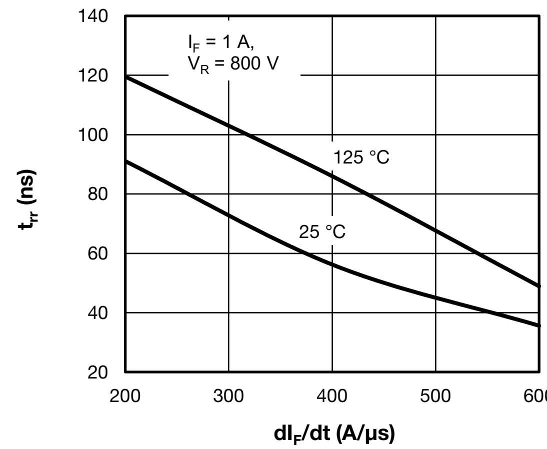


Fig. 6 - Typical Reverse Recovery Time vs. dI_F/dt

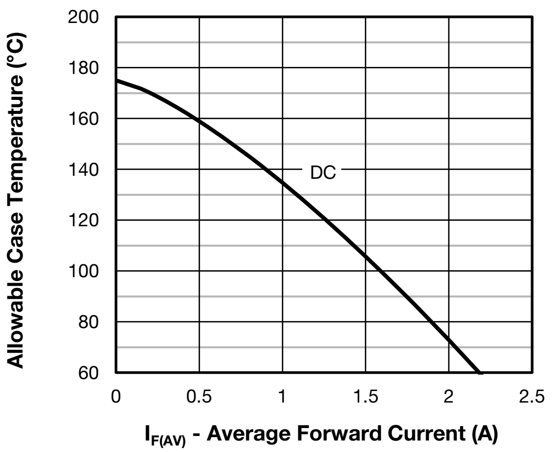


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

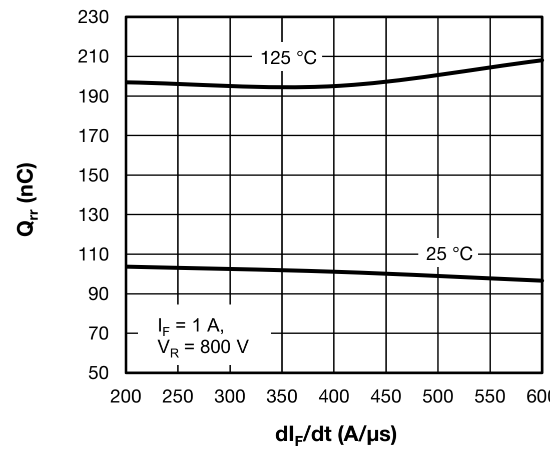


Fig. 7 - Typical Stored Charge vs. dI_F/dt

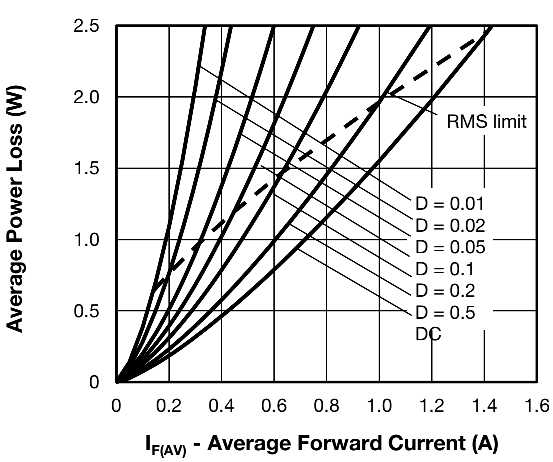


Fig. 5 - Forward Power Loss Characteristics

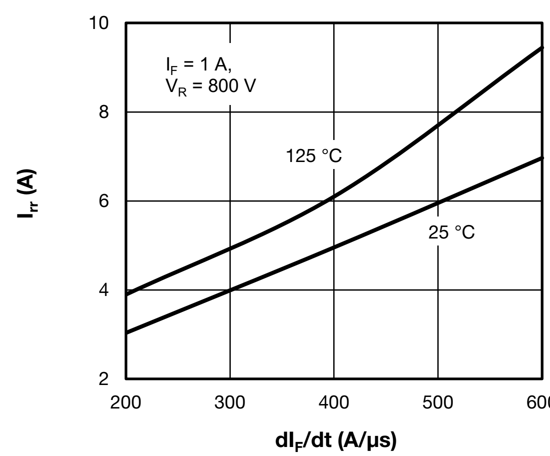


Fig. 8 - I_{rr} (A) vs. dI_F/dt

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

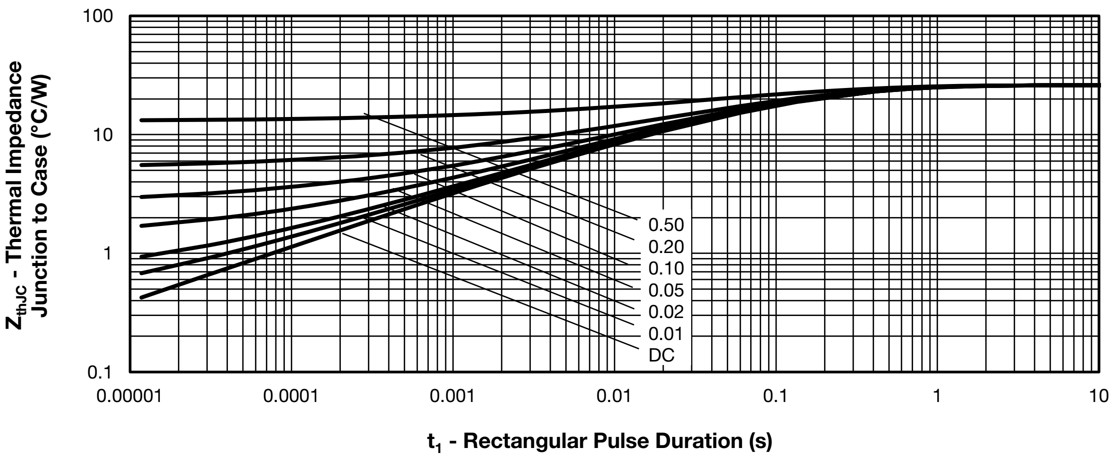


Fig. 9 - Transient Thermal Impedance, Junction to Case

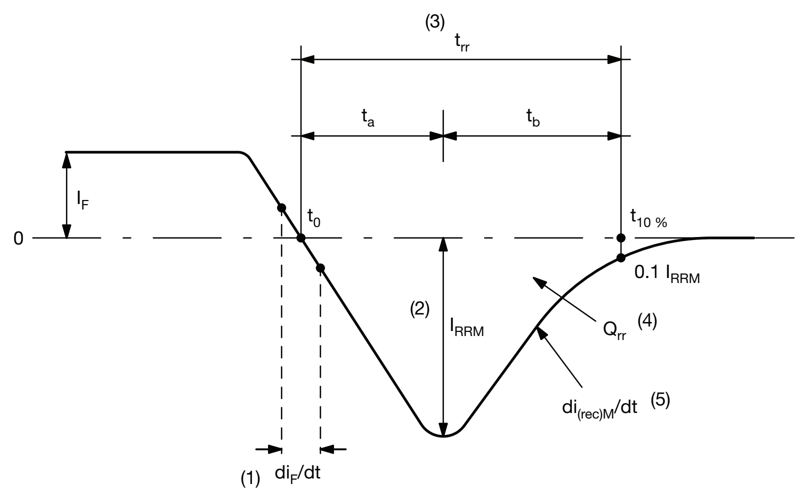


Fig. 10 - Reverse Recovery Waveform and Definitions

Notes

(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 t_0, crossing point of negative going I_F, to point $t_{10\%}$, 0.1 I_{RRM}

(4) Q_{rr} - area under curve defined by t_0 and $t_{10\ \%}$

$$Q_{rr} = \int_{t_0}^{t_{10\ \%}} I(t)dt$$

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

ORDERING INFORMATION TABLE

Device code	VS-	E	7	F	X	01	12	-M3
	1	2	3	4	5	6	7	8

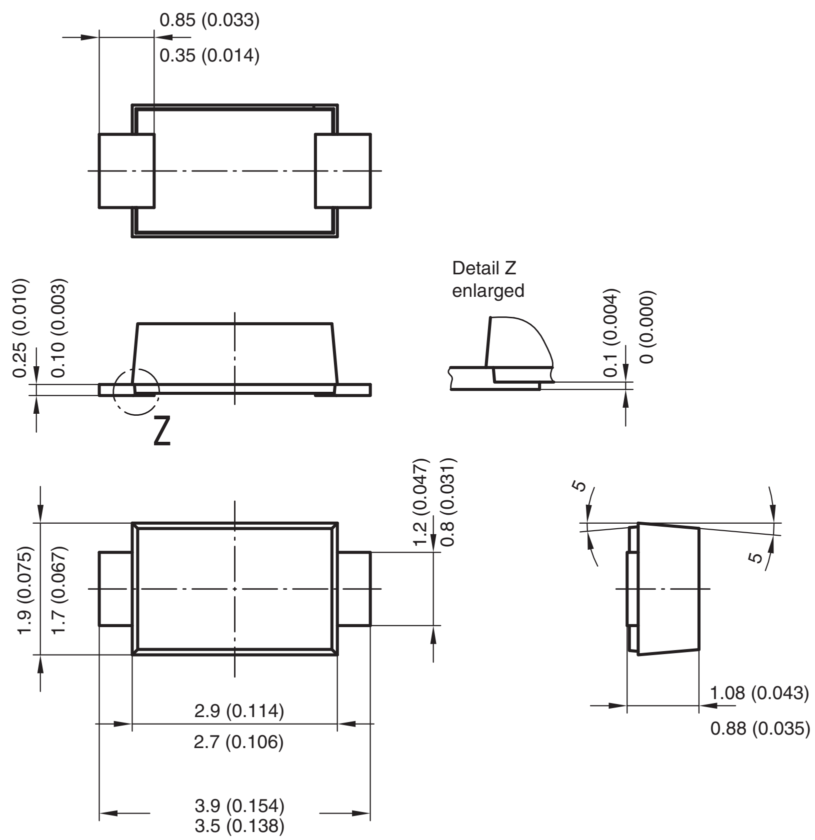
- 1 - Vishay Semiconductors product
- 2 - Circuit configuration:
  E = single diode
- 3 - 7 = FRED generation 7
- 4 - F = SMF package
- 5 - Process type,
  X = hyperfast recovery
- 6 - Current rating (01 = 1 A)
- 7 - Voltage code (12 = 1200 V)
- 8 - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER REEL**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-E7FX0112-M3/I	10 000	10 000	13"diameter plastic tape and reel

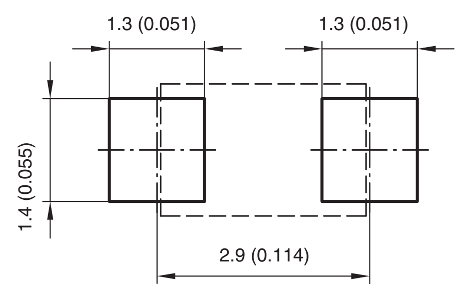
LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95572
Part marking information	www.vishay.com/doc?95618
Packaging information	www.vishay.com/doc?95577
SPICE model	www.vishay.com/doc?97264

SMF (DO-219AB)

DIMENSIONS in millimeters (inches)



Foot print recommendation:



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