Hyperfast Rectifier, 1 A FRED Pt®

eSMP® Series

Top view Bottom view

SMF (DO-219AB)

LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	1 A
V_R	650 V
V_F at I_F	1.05 V
t_{rr}	25 ns
T_J max.	175 °C
Package	SMF (DO-219AB)
Circuit configuration	Single

FEATURES

- 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
- AEC-Q101 qualified, meets JESD 201 class 2 whisker test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

RoHS COMPLIANT

HALOGEN FREE

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}		650	V
Average rectified forward current	$I_{F(AV)}$	T_{SP} = 147 °C, DC conduction	1	A
Non-repetitive peak surge current	I_{FSM}	T_J = 25 °C, 8.3 ms sine pulse	21	
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	650	-	-	V
Forward voltage, per diode	V_F	I_F = 1 A	-	1.30	1.45	V
		I_F = 1 A, T_J = 125 °C	-	1.1	1.2	
		I_F = 1 A, T_J = 150 °C	-	1.05	1.15	
Reverse leakage current, per diode	I_R	V_R = V_R rated	-	-	3	µA
		T_J = 125 °C, V_R = V_R rated	-	-	15	
Junction capacitance	C_T	V_R = 4 V	-	10	-	pF
		V_R = 650 V	-	3.5	-	

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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 = 0.5 A, I_R = 1 A, I_{rr} = 0.25 A		-	16	25	ns
		T_J = 25 °C	I_F = 1 A, dI_F/dt = 500 A/µs, V_R = 400 V	-	20	-	
		T_J = 125 °C		-	30	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	2.5	-	A
		T_J = 125 °C		-	3	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	30	-	nC
		T_J = 125 °C		-	55	-	

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)	MUX			

Note

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

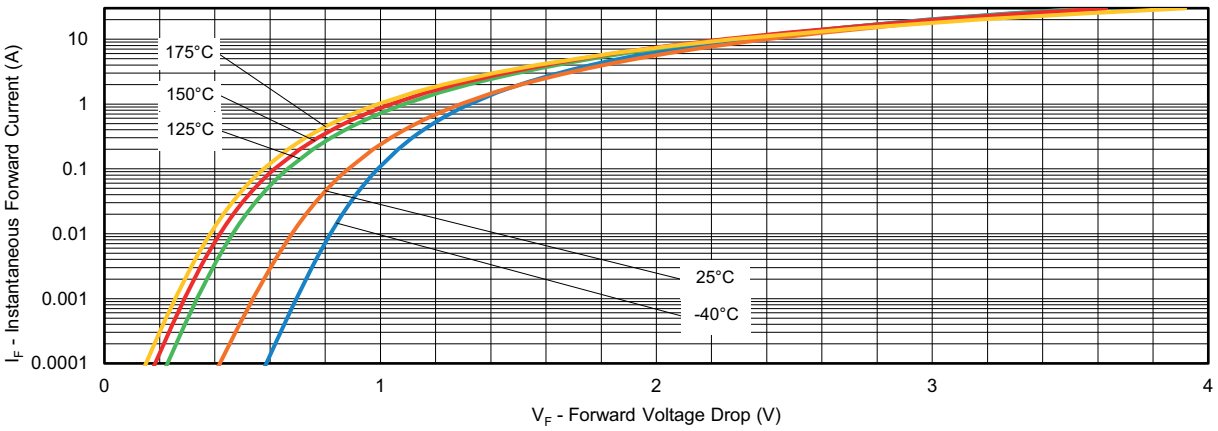

Fig. 1 - Typical Forward Voltage Drop Characteristics

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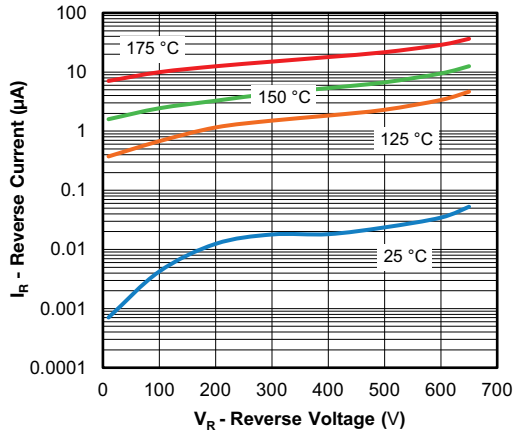

Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

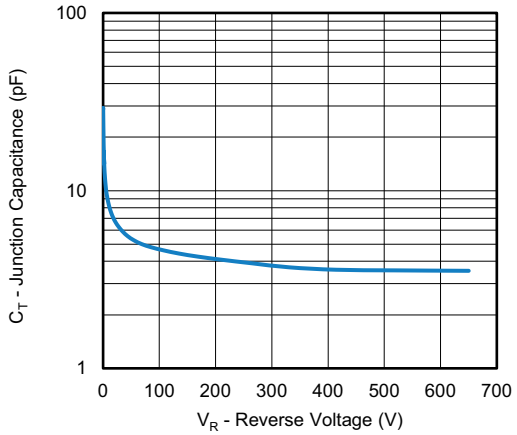

Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

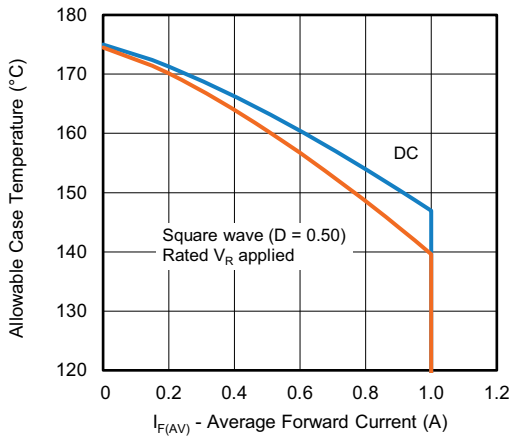

Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

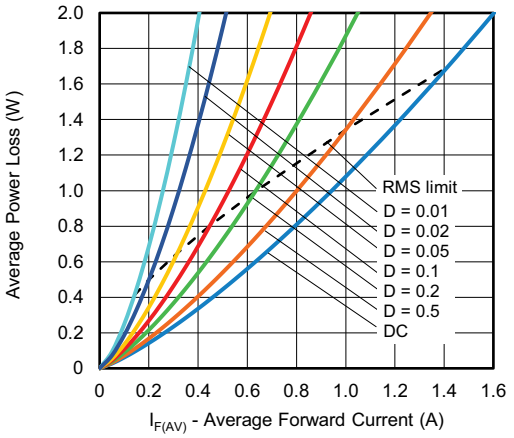

Fig. 5 - Forward Power Loss Characteristics

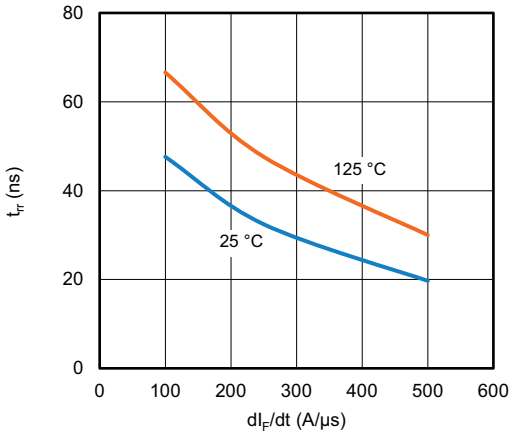

Fig. 6 - Typical Reverse Recovery Time vs. dI_F/dt

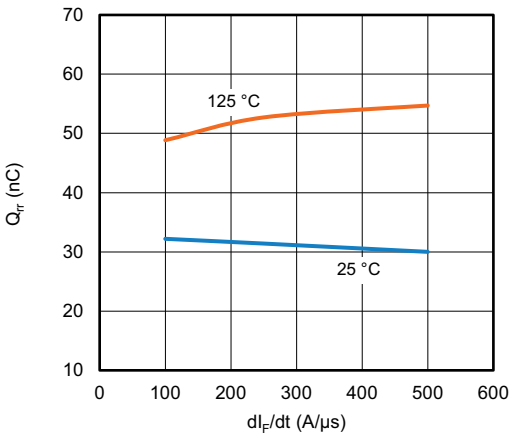

Fig. 7 - Typical Stored Charge vs. dI_F/dt

Note

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
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

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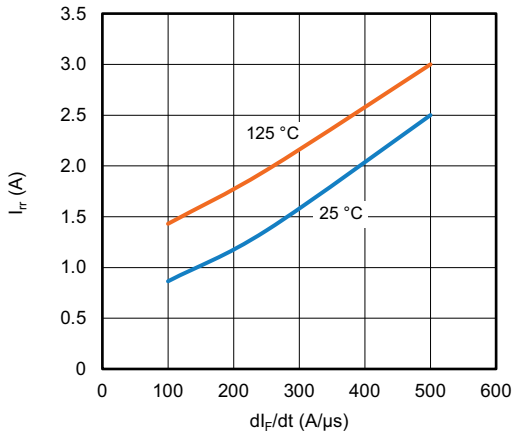

Fig. 8 - I_{rr} (A) vs. dI_F/dt

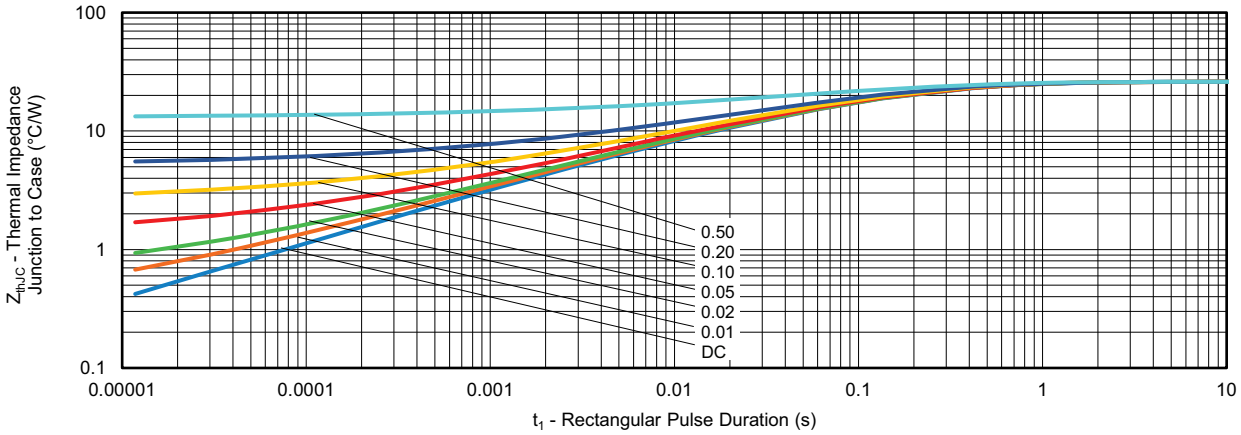

Fig. 9 - Transient Thermal Impedance, Junction to Case

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ORDERING INFORMATION TABLE

Device code

VS-	E	7	F	X	01	07	H	M3
1	2	3	4	5	6	7	8	9

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 (07 = 650 V)

8 - H = AEC-Q101 qualified

9 - 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-E7FX0107HM3/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?97545

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