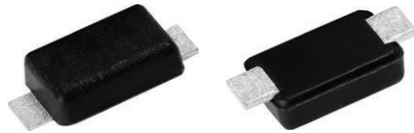


## Hyperfast Rectifier, 2 A FRED Pt<sup>®</sup>

### eSMP<sup>®</sup> Series



Top view

Bottom view

### SMF (DO-219AB)

Cathode Anode

### 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
- Meets JESD 201 class 2 whisker test
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?999912](http://www.vishay.com/doc?999912)


**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**

### LINKS TO ADDITIONAL RESOURCES



3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2 A
$V_R$	650 V
$V_F$ at $I_F$	1.12 V
$t_{rr}$	27 ns
$T_J$ max.	175 °C
Package	SMF (DO-219AB)
Circuit configuration	Single

### 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	$I_{F(AV)}$	$T_{Sp} = 115$ °C, DC conduction	2	A
Non-repetitive peak surge current	$I_{FSM}$	$T_J = 25$ °C, 8.3 ms sine pulse	27	
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	$V_{BR}, V_R$	$I_R = 100$ $\mu$ A	650	-	-	V
Forward voltage, per diode	$V_F$	$I_F = 2$ A	-	1.35	1.50	
		$I_F = 2$ A, $T_J = 125$ °C	-	1.18	1.28	
Reverse leakage current, per diode	$I_R$	$V_R = V_R$ rated	-	-	4	$\mu$ A
		$T_J = 125$ °C, $V_R = V_R$ rated	-	-	16	
Junction capacitance	$C_T$	$V_R = 4$ V	-	12	-	pF
		$V_R = 650$ V	-	4	-	



DYNAMIC RECOVERY CHARACTERISTICS (T <sub>J</sub> = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 0.5 A, I <sub>R</sub> = 1 A, I <sub>rr</sub> = 0.25 A	-	16	27	ns
		T <sub>J</sub> = 25 °C	-	25	-	
		T <sub>J</sub> = 125 °C	-	35	-	
Peak recovery current	I <sub>RRM</sub>	T <sub>J</sub> = 25 °C	-	3	-	A
		T <sub>J</sub> = 125 °C	-	4	-	
Reverse recovery charge	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C	-	50	-	nC
		T <sub>J</sub> = 125 °C	-	105	-	

THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-55	-	175	°C
Thermal resistance, junction to mount	R <sub>thJM</sub> <sup>(1)</sup>	Device mounted on PCB with 2 x 3.5 mm soldering lands	-	23	26	°C/W
Thermal resistance, junction to ambient	R <sub>thJA</sub>	Device mounted on PCB with recommended pad size	-	125	-	°C/W
Approximate weight				0.015		g
Marking device		Case style SMF (DO-219AB)		MVX		

**Note**

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

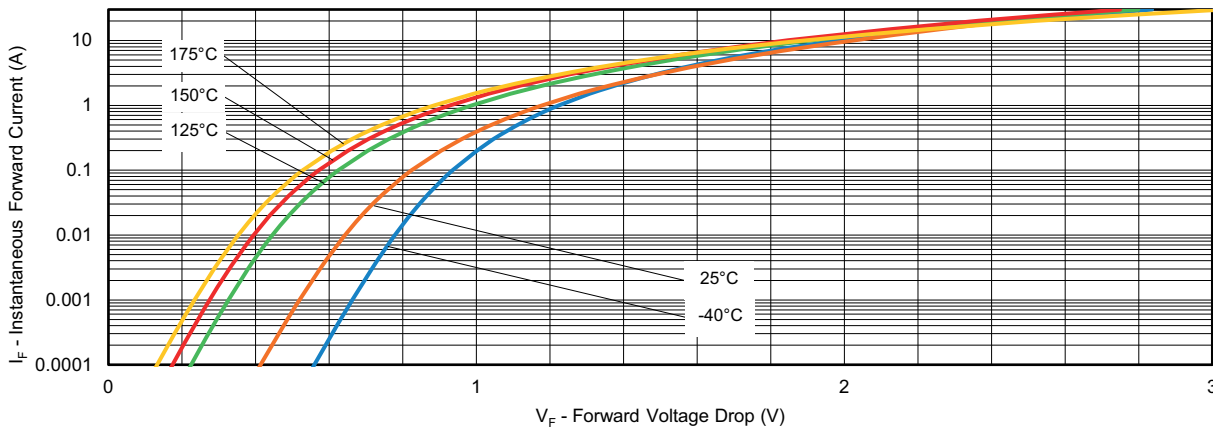


Fig. 1 - Typical Forward Voltage Drop Characteristics

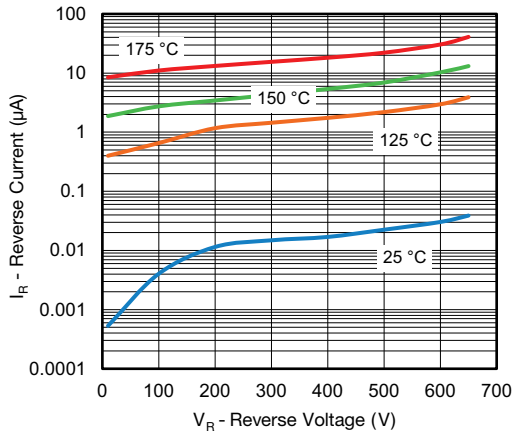


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

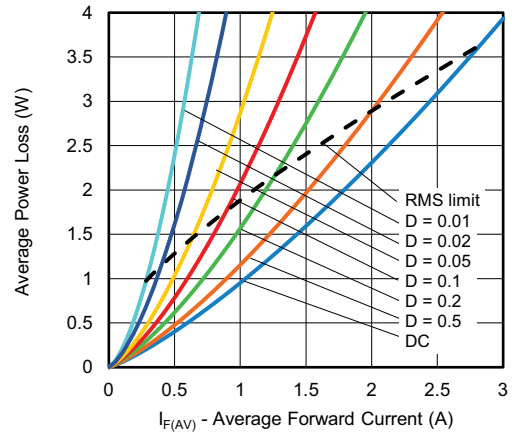


Fig. 5 - Forward Power Loss Characteristics

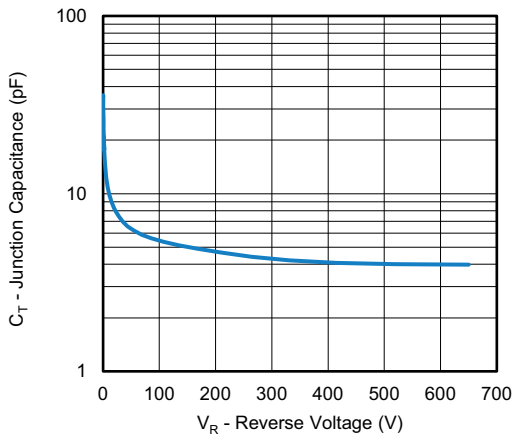


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

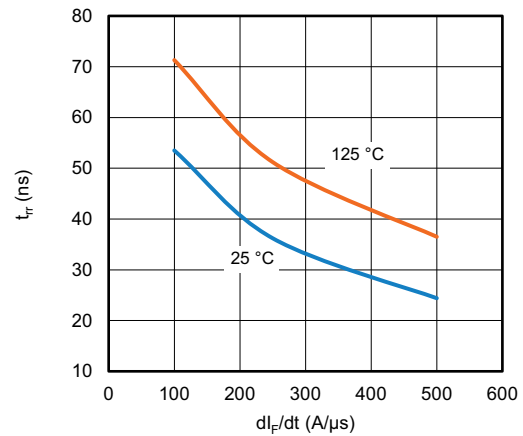


Fig. 6 - Typical Reverse Recovery Time vs.  $dI_F/dt$

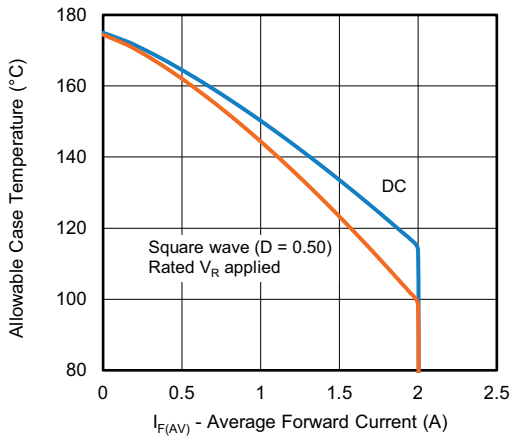


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

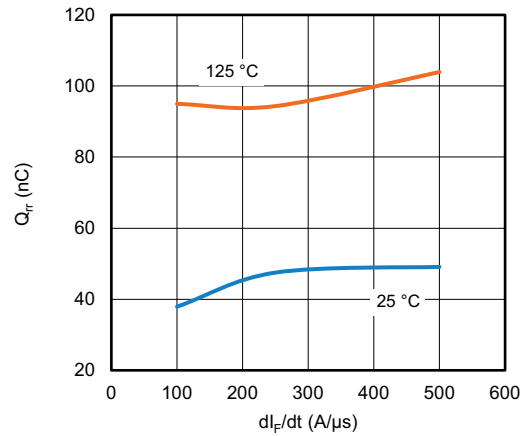


Fig. 7 - Typical Stored Charge vs.  $dI_F/dt$

**Note**

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

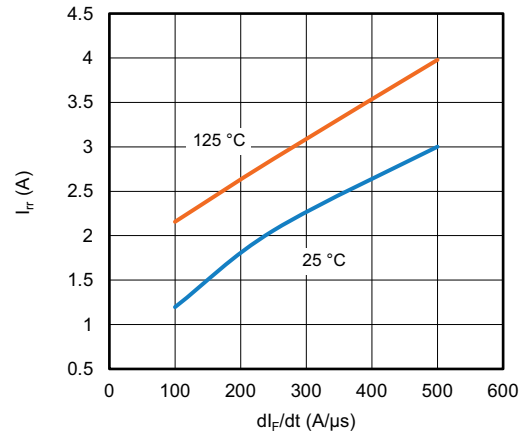


Fig. 8 -  $I_{rr}$  (A) vs.  $dI_r/dt$

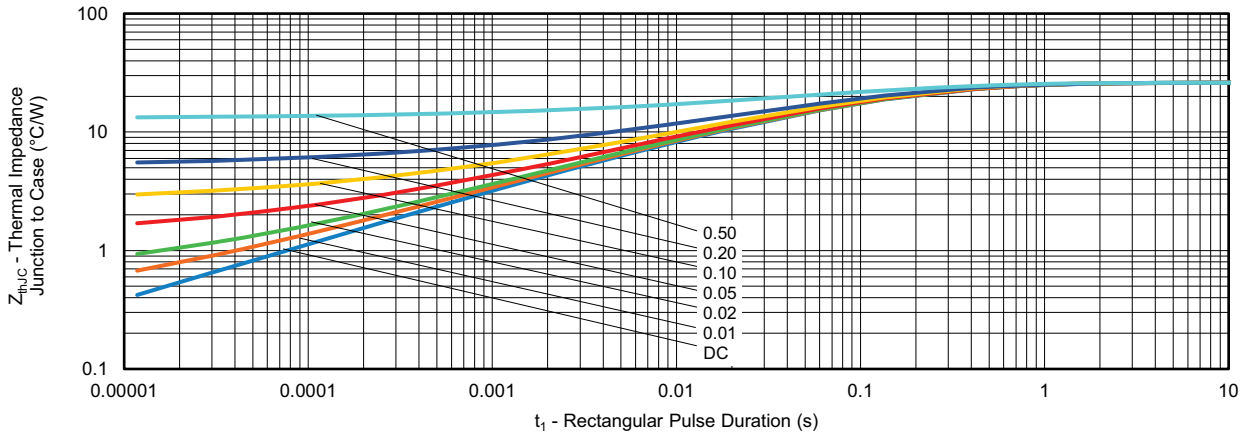
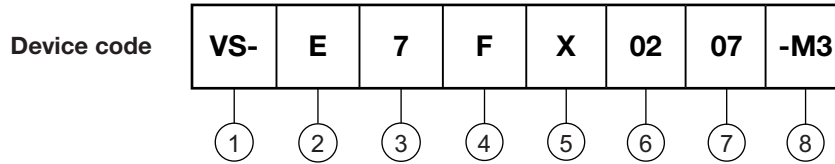


Fig. 9 - Transient Thermal Impedance, Junction to Case



ORDERING INFORMATION TABLE



- 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 (02 = 2 A)
- 7** - Voltage code (07 = 650 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-E7FX0207-M3/I	10 000	10 000	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95572">www.vishay.com/doc?95572</a>
Part marking information	<a href="http://www.vishay.com/doc?95618">www.vishay.com/doc?95618</a>
Packaging information	<a href="http://www.vishay.com/doc?95577">www.vishay.com/doc?95577</a>
SPICE model	<a href="http://www.vishay.com/doc?97546">www.vishay.com/doc?97546</a>



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