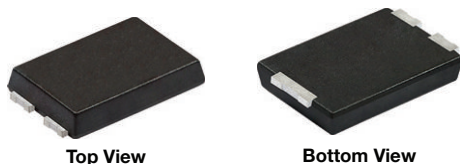
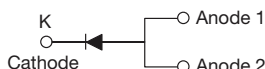


Hyperfast Rectifier, 3 A FRED Pt®

eSMP® Series



SMPC HV



LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	3 A
V_R	1200 V
V_F at I_F	1.45 V
t_{rr}	50 ns
T_J max.	175 °C
Package	SMPC HV
Circuit configuration	Single

FEATURES

- Minimum creepage distance 5.4 mm
- Comparative tracking index: $CTI \geq 600$
- Hyperfast recovery time, reduced Q_{rr} , and soft recovery
- 175 °C maximum operating junction temperature
- Low junction capacitance
- 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
- Footprint compatible with TO-277A
- 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: SMPC HV

Molding compound meets UL 94 V-0 flammability rating, halogen-free, RoHS-compliant

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	$I_{F(AV)}$	$T_{sp} = 105$ °C, DC conduction	3	A
Non-repetitive peak surge current	I_{FSM}	$T_J = 25$ °C, 8.3 ms sine pulse	70	
Operating junction and storage temperatures	T_J, T_{Stg}		-55 to +175	°C

**ELECTRICAL SPECIFICATIONS** ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	V_{BR}, V_R	$I_R = 100\text{ }\mu\text{A}$	1200	-	-	V
Forward voltage drop	V_F	$I_F = 3\text{ A}$	-	1.85	2.30	
		$I_F = 3\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$	-	1.55	1.75	
		$I_F = 3\text{ A}, T_J = 150\text{ }^{\circ}\text{C}$	-	1.45	1.65	
Reverse leakage current	I_R	$V_R = V_R\text{ rated}$	-	-	5	μA
		$T_J = 125\text{ }^{\circ}\text{C}, V_R = V_R\text{ rated}$	-	-	50	
Junction capacitance	C_T	$V_R = 1200\text{ V}, 1\text{ MHz}$	-	6.7	-	pF
		$V_R = 4\text{ V}, 1\text{ MHz}$	-	20	-	

DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	$I_F = 0.5\text{ A}, I_R = 1\text{ A}, I_{rr} = 0.25\text{ A}$	-	40	50	ns
		$T_J = 25\text{ }^{\circ}\text{C}$	-	100	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	125	-	
Peak recovery current	I_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$	-	5	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	7.5	-	
Reverse recovery charge	Q_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	-	240	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	510	-	

THERMAL AND MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		-55	-	175	$^{\circ}\text{C}$
Thermal resistance, junction to mount	$R_{thJM}^{(1)}$	Device mounted on PCB with recommended pad size	-	12	15	$^{\circ}\text{C/W}$
Thermal resistance, junction to ambient	R_{thJA}	Device mounted on PCB with recommended pad size	-	95	-	$^{\circ}\text{C/W}$
Approximate weight			0.1			g
Marking device		Case style SMPC HV	GEX12			

Note

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

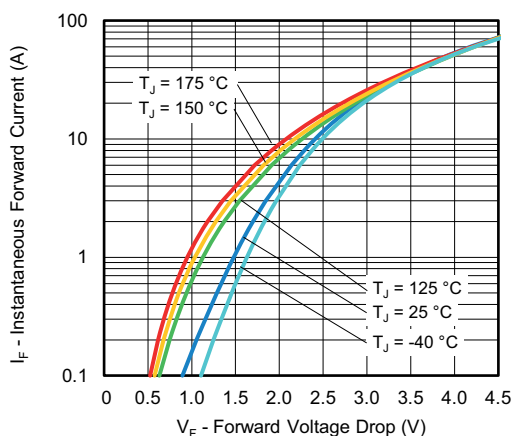


Fig. 1 - Typical Forward Voltage Drop Characteristics

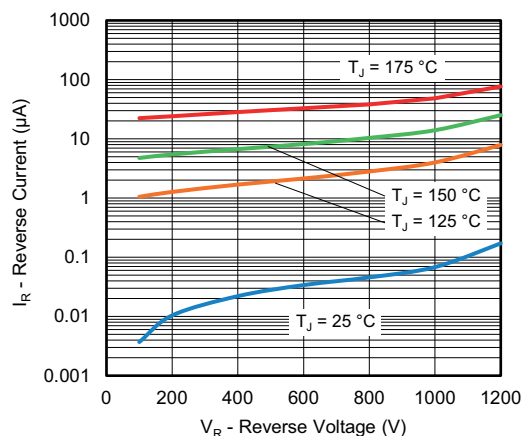


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

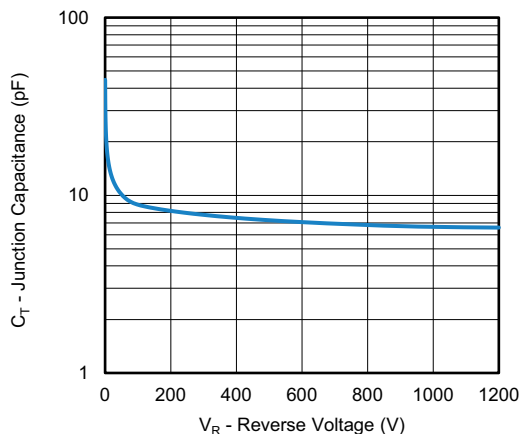


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

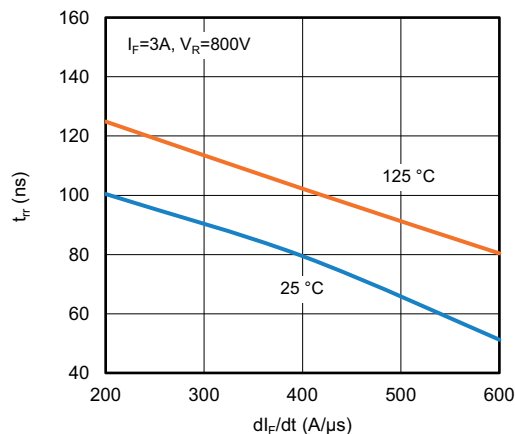
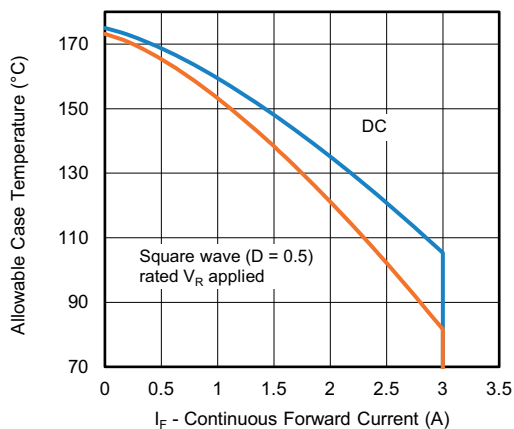

Fig. 6 - Typical Reverse Recovery Time vs. dI_F/dt


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

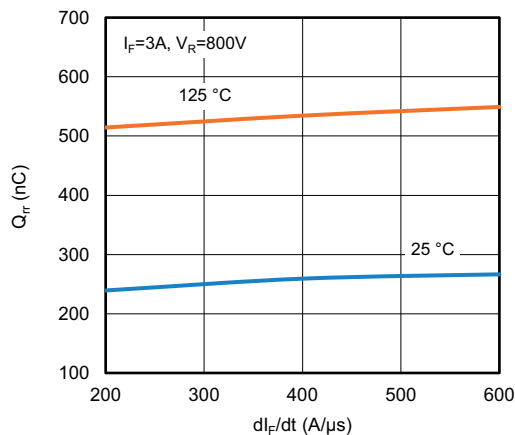
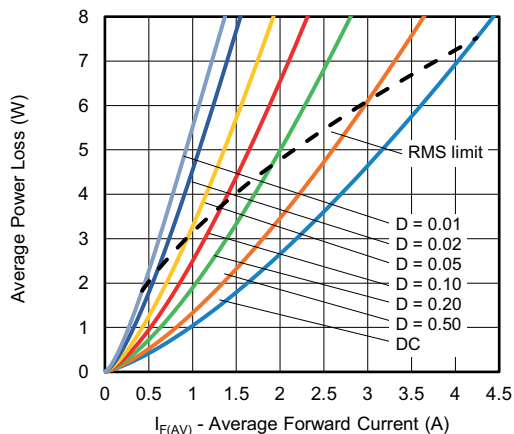
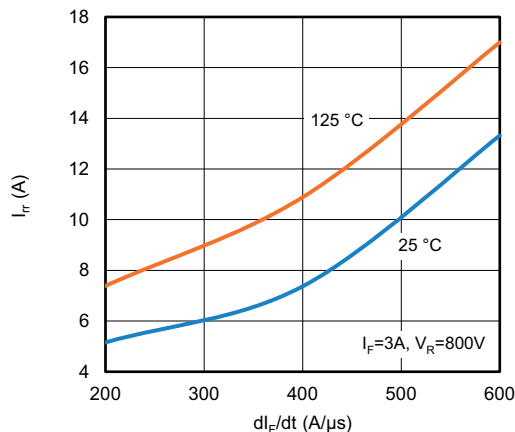

Fig. 7 - Typical Stored Charge vs. dI_F/dt


Fig. 5 - Forward Power Loss Characteristics


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

Note

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

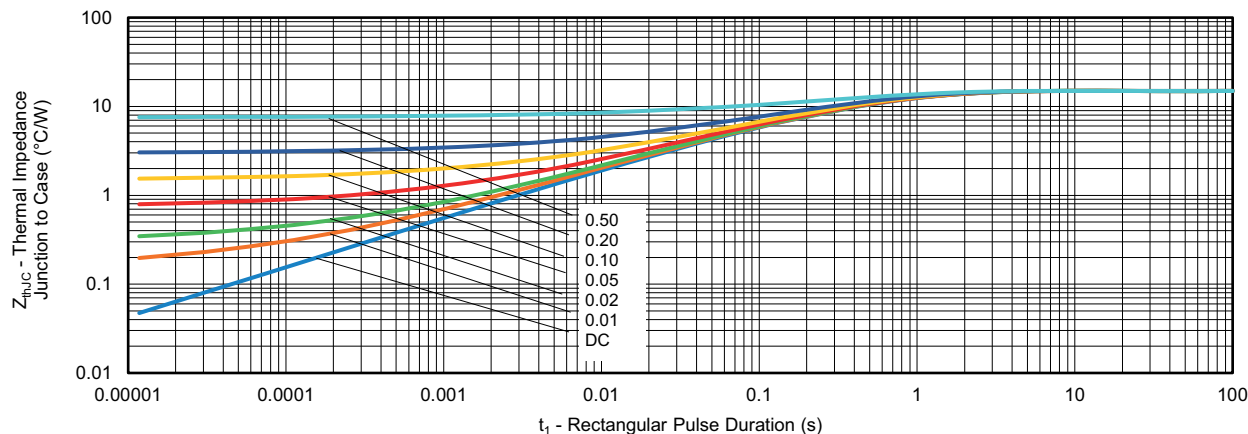


Fig. 9 - Transient Thermal Impedance, Junction to Case

ORDERING INFORMATION TABLE

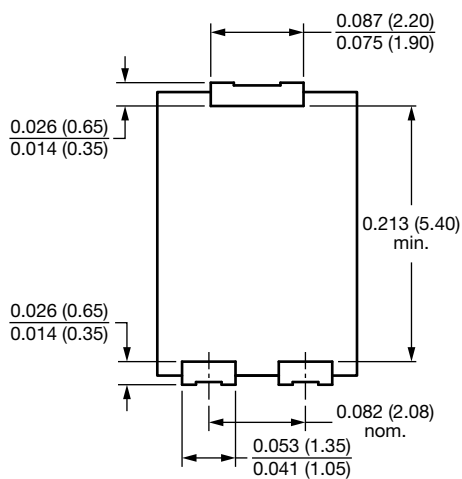
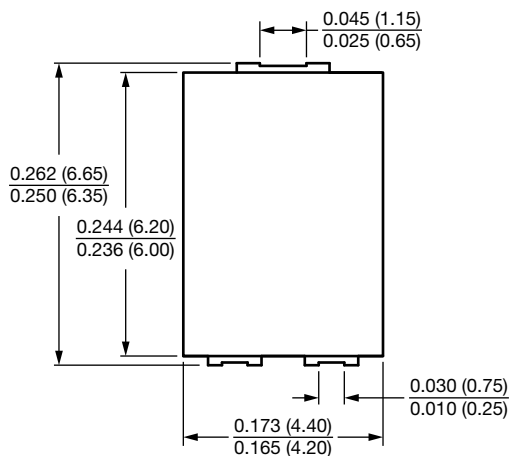
Device code	VS-	E	7	S	X	03	12	H	M3	V
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
①	- Vishay Semiconductors product									
②	- Circuit configuration: E = single diode									
③	- 7 = FRED generation 7									
④	- S = SMPC HV package									
⑤	- Process type, X = hyperfast recovery									
⑥	- Current rating (03 = 3 A)									
⑦	- Voltage code (12 = 1200 V)									
⑧	- H = AEC-Q101 qualified									
⑨	- M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free									
⑩	- Package type: V = high voltage									

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER REEL	BASE QUANTITY	PACKAGING DESCRIPTION
VS-E7SX0312HM3V/I	6500	6500	13" diameter plastic tape and reel

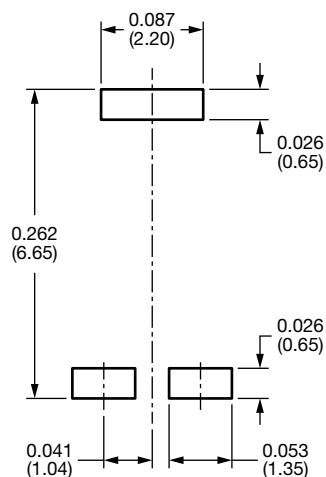
LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?97324
Part marking information	www.vishay.com/doc?95565
Packaging information	www.vishay.com/doc?98884

SMPC HV

DIMENSIONS in inches (millimeters)



Mounting Pad Layout





Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.