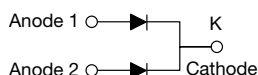
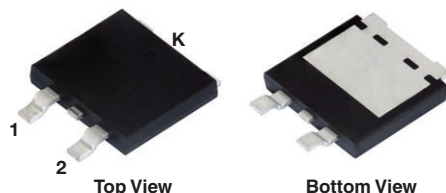


# Hyperfast Rectifier, 2 x 10 A FRED Pt®

## eSMP® Series SMPD (TO-263AC)



## 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](http://www.vishay.com/doc?99912)



## LINKS TO ADDITIONAL RESOURCES



## PRIMARY CHARACTERISTICS

$I_{F(AV)}$	2 x 10 A
$V_R$	200 V
$V_F$ at $I_F$	0.77 V
$t_{rr}$	25 ns
$T_J$ max.	175 °C
Package	SMPD (TO-263AC)
Circuit configuration	Common cathode

## 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 in the output rectification stage of SMPS, telecom, DC/DC converters as well as freewheeling diode in low voltage inverters and chopper motor drives.

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

## MECHANICAL DATA

**Case:** SMPD (TO-263AC)

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

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

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	$V_{RRM}$		200	V
Average rectified forward current	$I_{F(AV)}$	$T_{solder\ pad} = 152\ ^\circ C$	20	A
			10	
Non-repetitive peak surge current	$I_{FSM}$	$T_J = 25\ ^\circ C$ , 6 ms square pulse	210	
			110	

## ELECTRICAL SPECIFICATIONS ( $T_J = 25\ ^\circ C$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	$V_{BR}, V_R$	$I_R = 100\ \mu A$	200	-	-	V
Forward voltage, per diode	$V_F$	$I_F = 10\ A$	-	0.94	1.05	
		$I_F = 10\ A, T_J = 150\ ^\circ C$	-	0.77	0.87	
Reverse leakage current, per diode	$I_R$	$V_R = V_R$ rated	-	-	2	$\mu A$
		$T_J = 150\ ^\circ C, V_R = V_R$ rated	-	10	150	
Junction capacitance, per diode	$C_T$	$V_R = 200\ V$	-	30	-	pF

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 1\text{ A}$ , $dl_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	25	-	ns
		$I_F = 0.5\text{ A}$ , $I_R = 1\text{ A}$ , $I_{rr} = 0.25\text{ A}$	-	-	25	
		$T_J = 25\text{ }^{\circ}\text{C}$	-	22	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	35	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	2.5	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	5	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	25	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	85	-	

**THERMAL - 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, per diode junction to mount	$R_{thJM}$		-	1.8	2.4	$^{\circ}\text{C}/\text{W}$
Approximate weight			0.55			g
			0.02			oz.
Marking device		Case style SMPD (TO-263AC)	20CDH02			

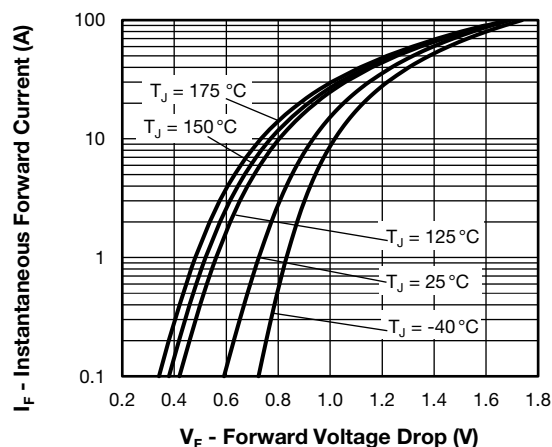


Fig. 1 - Typical Forward Voltage Drop Characteristics

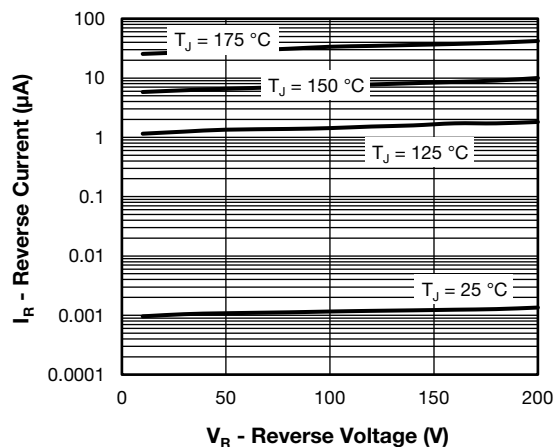


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

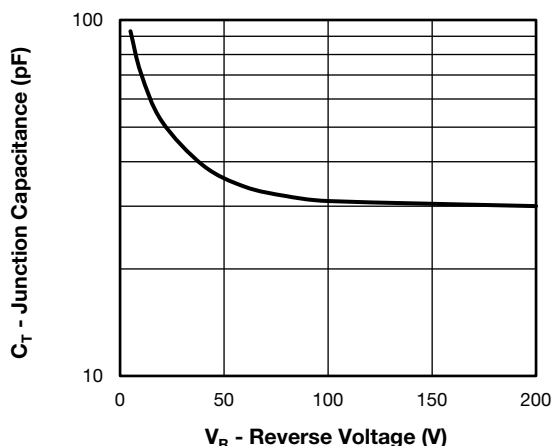


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

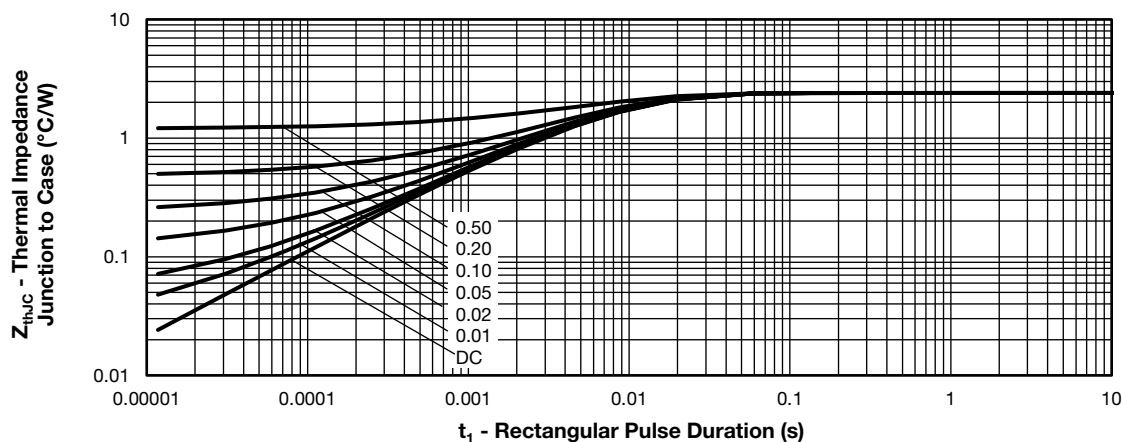
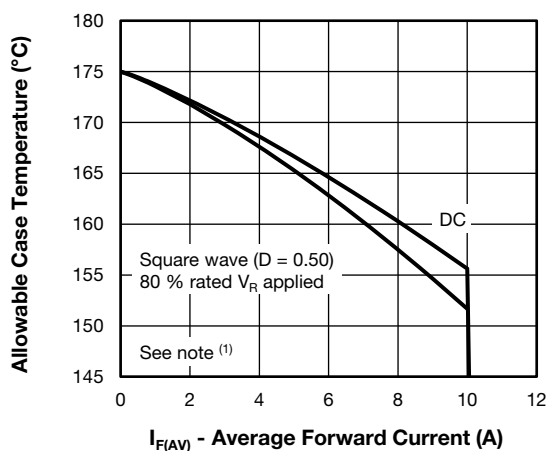

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


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

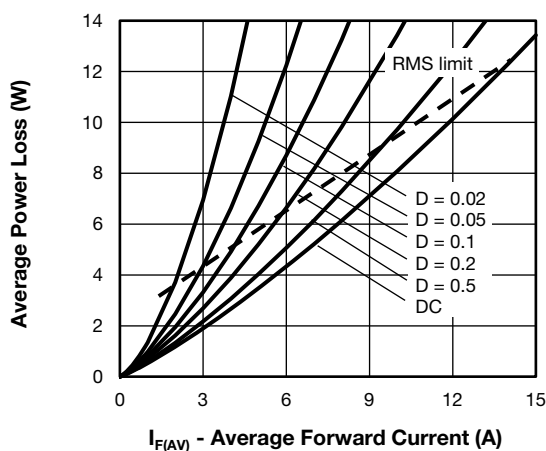


Fig. 6 - Forward Power Loss Characteristics

#### 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 =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1}$  = rated  $V_R$

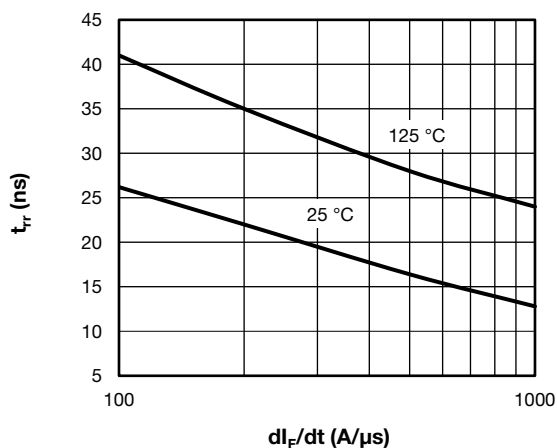
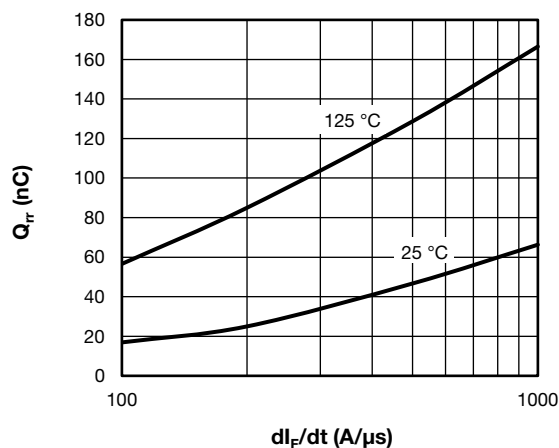
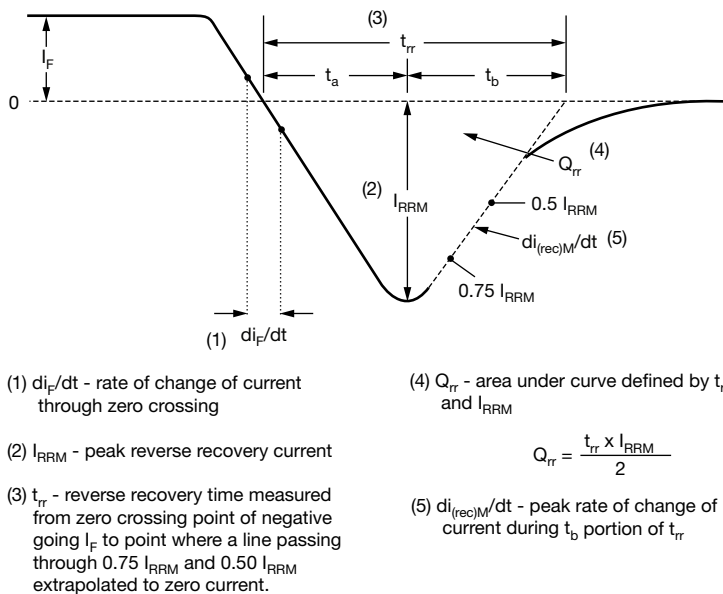

Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$ 

Fig. 8 - Typical Stored Charge vs.  $di_F/dt$ 


Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

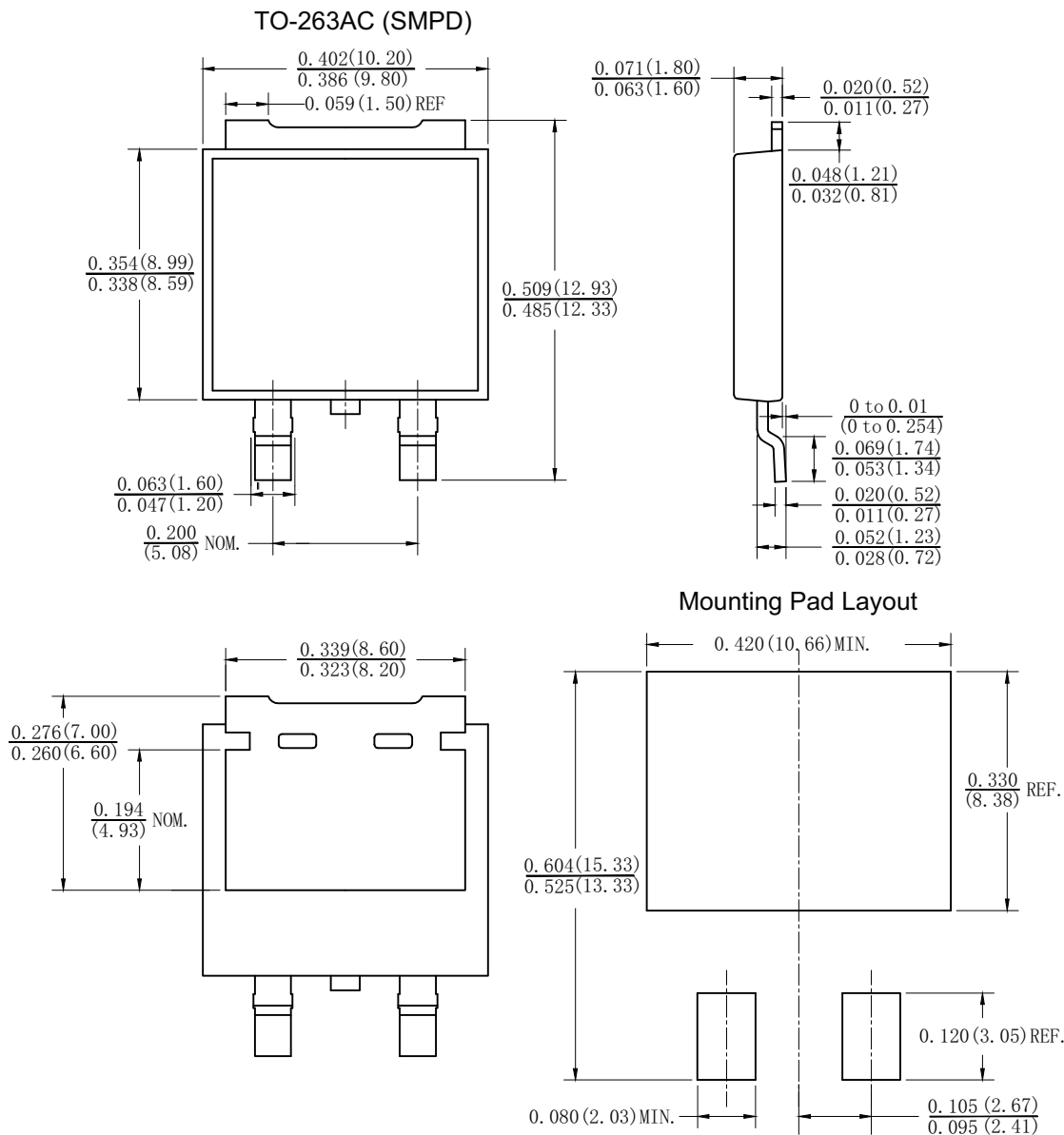
Device code	VS-	20	C	D	H	02	H	M3
	1	2	3	4	5	6	7	8
	1	-	Vishay Semiconductors product					
	2	-	Current rating (20 A)					
	3	-	Circuit configuration: C = common cathode					
	4	-	D = SMPD package					
	5	-	Process type, H = hyperfast recovery					
	6	-	Voltage code (02 = 200 V)					
	7	-	H = AEC-Q101 qualified					
	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-20CDH02HM3/I	2000	2000	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95604">www.vishay.com/doc?95604</a>
Part marking information	<a href="http://www.vishay.com/doc?95566">www.vishay.com/doc?95566</a>
Packaging information	<a href="http://www.vishay.com/doc?88869">www.vishay.com/doc?88869</a>
SPICE model	<a href="http://www.vishay.com/doc?96572">www.vishay.com/doc?96572</a>

### TO-263AC (SMPD)

**DIMENSIONS** in inches (millimeters)





## 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.