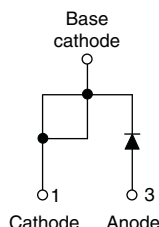


# HEXFRED® Ultrafast Soft Recovery Diode, 25 A



TO-220AC



## FEATURES

- Ultrafast and ultrasoft recovery
- Very low  $I_{RRM}$  and  $Q_{rr}$
- 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)



## BENEFITS

- Reduced RFI and EMI
- Reduced power loss in diode and switching transistor
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

## DESCRIPTION

VS-HFA25TB60... is a state of the art ultrafast recovery diode. Employing the latest in epitaxial construction and advanced processing techniques it features a superb combination of characteristics which result in performance which is unsurpassed by any rectifier previously available. With basic ratings of 600 V and 25 A continuous current, the VS-HFA25TB60... is especially well suited for use as the companion diode for IGBTs and MOSFETs. In addition to ultrafast recovery time, the HEXFRED® product line features extremely low values of peak recovery current ( $I_{RRM}$ ) and does not exhibit any tendency to “snap-off” during the  $t_b$  portion of recovery. The HEXFRED features combine to offer designers a rectifier with lower noise and significantly lower switching losses in both the diode and the switching transistor. These HEXFRED advantages can help to significantly reduce snubbing, component count and heatsink sizes. The HEXFRED VS-HFA25TB60... is ideally suited for applications in power supplies and power conversion systems (such as inverters), motor drives, and many other similar applications where high speed, high efficiency is needed.

## PRODUCT SUMMARY

Package	TO-220AC
$I_{F(AV)}$	25 A
$V_R$	600 V
$V_F$ at $I_F$	1.7 V
$t_{rr}$ typ.	23 ns
$T_J$ max.	150 °C
Diode variation	Single die

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	$V_R$		600	V
Maximum continuous forward current	$I_F$	$T_C = 100\text{ °C}$	25	A
Single pulse forward current	$I_{FSM}$		225	
Maximum repetitive forward current	$I_{FRM}$		100	
Maximum power dissipation	$P_D$	$T_C = 25\text{ °C}$	125	W
		$T_C = 100\text{ °C}$	50	
Operating junction and storage temperature range	$T_J, T_{Stg}$		- 55 to + 150	°C



ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX. UNITS
Cathode to anode breakdown voltage	$V_{BR}$	$I_R = 100\text{ }\mu\text{A}$		600	-	- V
Maximum forward voltage	$V_{FM}$	$I_F = 25\text{ A}$	See fig. 1	-	1.3	1.7
		$I_F = 50\text{ A}$		-	1.5	2.0
		$I_F = 25\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$		-	1.3	1.7
Maximum reverse leakage current	$I_{RM}$	$V_R = V_R\text{ rated}$	See fig. 2	-	1.5	20
		$T_J = 125\text{ }^{\circ}\text{C}, V_R = 0.8 \times V_R\text{ rated}$		-	600	2000 $\mu\text{A}$
Junction capacitance	$C_T$	$V_R = 200\text{ V}$	See fig. 3	-	55	100 pF
Series inductance	$L_S$	Measured lead to lead 5 mm from package body		-	8.0	- nH

DYNAMIC RECOVERY CHARACTERISTICS ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX. UNITS
Reverse recovery time See fig. 5, 6 and 16	$t_{rr}$	$I_F = 1.0\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}, V_R = 30\text{ V}$		-	23	- ns
	$t_{rr1}$	$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 25\text{ A}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$	-	50	75
	$t_{rr2}$	$T_J = 125\text{ }^{\circ}\text{C}$		-	105	160
Peak recovery current See fig. 7 and 8	$I_{RRM1}$	$T_J = 25\text{ }^{\circ}\text{C}$		-	4.5	10 A
	$I_{RRM2}$	$T_J = 125\text{ }^{\circ}\text{C}$		-	8.0	15
Reverse recovery charge See fig. 9 and 10	$Q_{rr1}$	$T_J = 25\text{ }^{\circ}\text{C}$		-	112	375 nC
	$Q_{rr2}$	$T_J = 125\text{ }^{\circ}\text{C}$		-	420	1200
Peak rate of fall of recovery current during $t_b$ See fig. 11 and 12	$dI_{(rec)M}/dt1$	$T_J = 25\text{ }^{\circ}\text{C}$		-	250	- A/ $\mu\text{s}$
	$dI_{(rec)M}/dt2$	$T_J = 125\text{ }^{\circ}\text{C}$		-	160	-

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX. UNITS
Lead temperature	$T_{lead}$	0.063" from case (1.6 mm) for 10 s		-	-	300 $^{\circ}\text{C}$
Thermal resistance, junction to case	$R_{thJC}$			-	-	1.0
Thermal resistance, junction to ambient	$R_{thJA}$	Typical socket mount		-	-	80 K/W
Thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, flat, smooth and greased		-	0.5	-
Weight				-	2.0	- g
				-	0.07	- oz.
Mounting torque				6.0 (5.0)	-	12 (10) kgf · cm (lbf · in)
Marking device		Case style TO-220AC		HFA25TB60H		

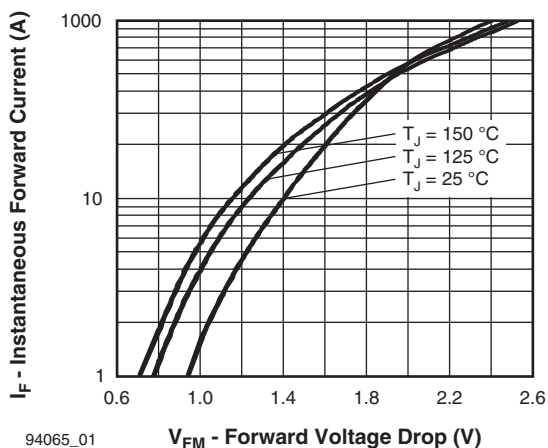


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

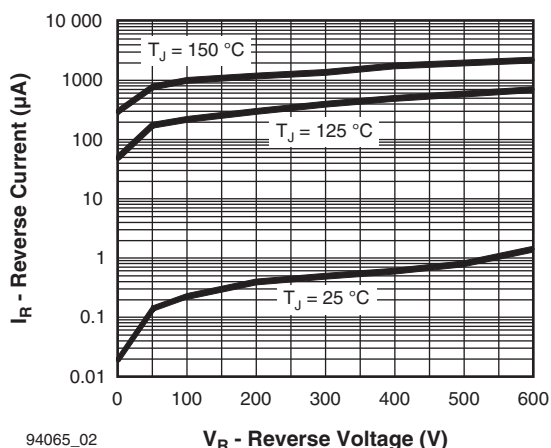


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

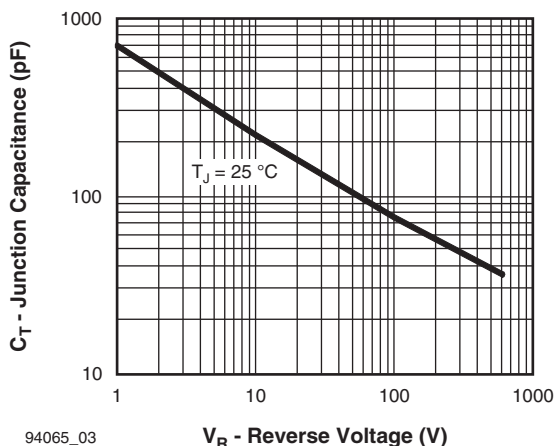


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

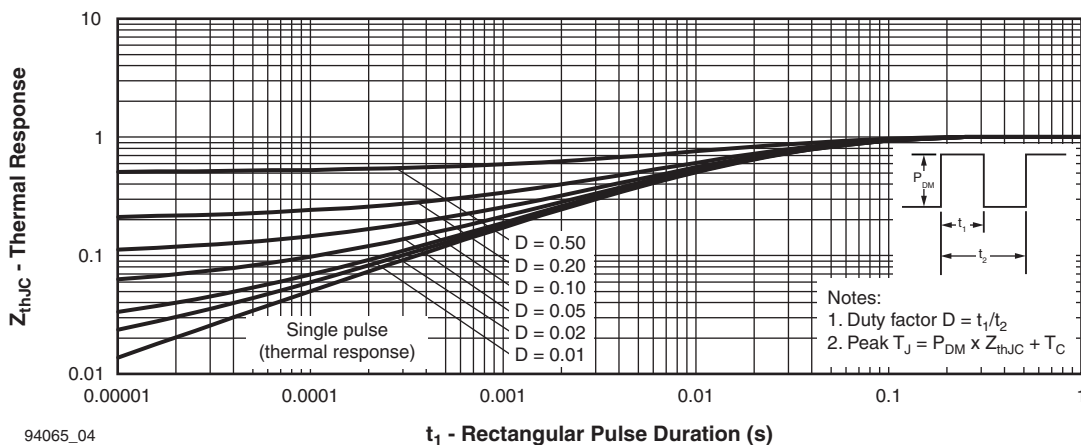
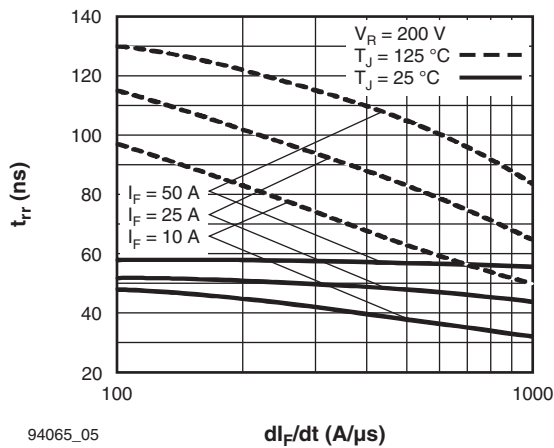
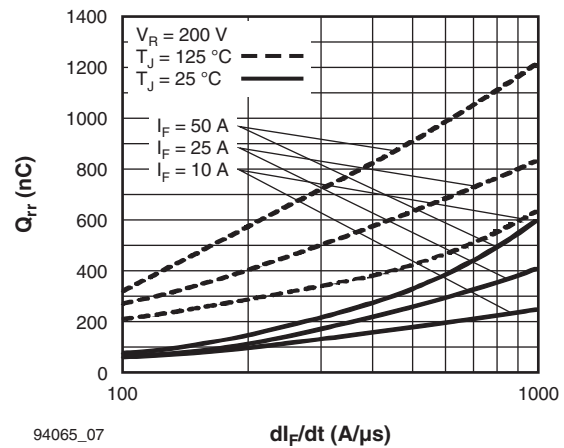
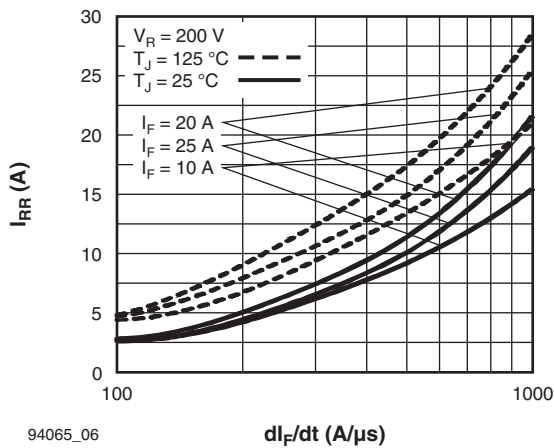
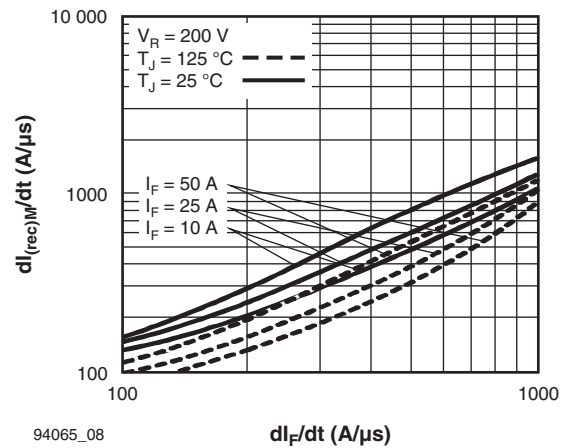


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


Fig. 5 - Typical Reverse Recovery Time vs.  $dI_F/dt$ 

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

Fig. 6 - Typical Recovery Current vs.  $dI_F/dt$ 

Fig. 8 - Typical  $dI_{(rec)M}/dt$  vs.  $dI_F/dt$

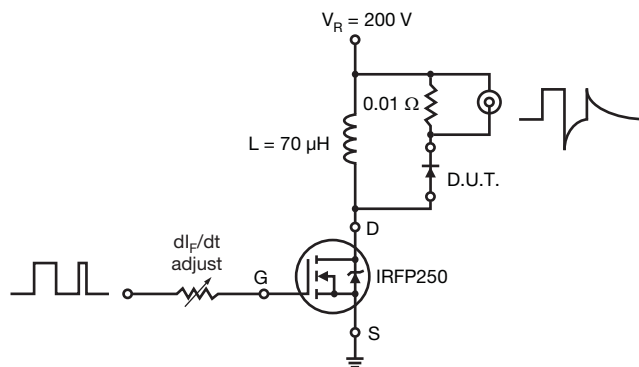


Fig. 9 - Reverse Recovery Parameter Test Circuit

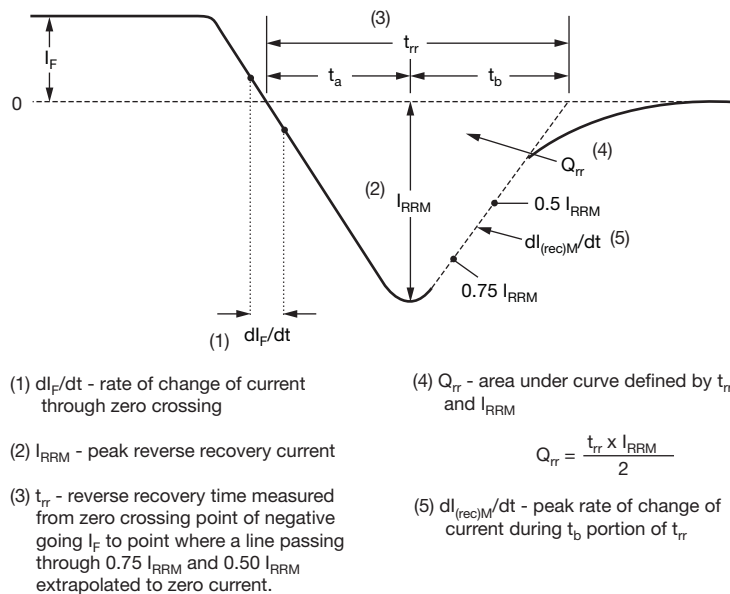


Fig. 10 - Reverse Recovery Waveform and Definitions

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>HF</b>	<b>A</b>	<b>25</b>	<b>TB</b>	<b>60</b>	<b>H</b>	<b>N3</b>
	1	2	3	4	5	6	7	8

- |          |  |
|----------|--|
| <b>1</b> | - Vishay Semiconductors product  |
| <b>2</b> | - HEXFRED® family  |
| <b>3</b> | - Electron irradiated  |
| <b>4</b> | - Current rating (25 = 25 A)   |
| <b>5</b> | - Package:<br>TB = TO-220AC  |
| <b>6</b> | - Voltage rating (60 = 600 V)  |
| <b>7</b> | - H = AEC-Q101 qualified   |
| <b>8</b> | - Environmental digit:<br>-N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free |

<b>ORDERING INFORMATION</b> (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-HFA25TB60HN3	50	1000	Antistatic plastic tube

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?95221">www.vishay.com/doc?95221</a>
Part marking information	<a href="http://www.vishay.com/doc?95068">www.vishay.com/doc?95068</a>
SPIICE model	<a href="http://www.vishay.com/doc?95471">www.vishay.com/doc?95471</a>



## 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.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. 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.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Vishay:

[VS-HFA25TB60HN3](#)