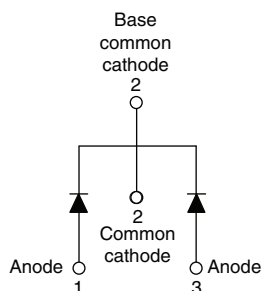


# HEXFRED® Ultrafast Soft Recovery Diode, 2 x 15 A



TO-220AB



## FEATURES

- Ultrafast and ultrasoft recovery
- Very low  $I_{RRM}$  and  $Q_{rr}$
- AEC-Q101 qualified, meets JESD 201 class 1A 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-HFA30TA60CHN3 is a state of the art center tap 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 15 A per leg continuous current, the VS-HFA30TA60CHN3 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-HFA30TA60CHN3 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-220AB
$I_{F(AV)}$	2 x 15 A
$V_R$	600 V
$V_F$ at $I_F$	1.7 V
$t_{rr}$ typ.	19 ns
$T_J$ max.	150 °C
Diode variation	Common cathode

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	$V_R$		600	V
Maximum continuous forward current <span style="float:right">per leg</span>	$I_F$	$T_C = 100\text{ °C}$	15	A
<span style="float:right">per device</span>			30	
Single pulse forward current	$I_{FSM}$		150	
Maximum repetitive forward current	$I_{FRM}$		60	
Maximum power dissipation	$P_D$	$T_C = 25\text{ °C}$	74	W
		$T_C = 100\text{ °C}$	29	
Operating junction and storage temperature range	$T_J, T_{Stg}$		-55 to +150	°C

**ELECTRICAL SPECIFICATIONS PER LEG** ( $T_J = 25\text{ }^{\circ}\text{C}$  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	$V_{FM}$	$I_F = 15\text{ A}$	-	1.3	1.7	
		$I_F = 30\text{ A}$	-	1.5	2.0	
		$I_F = 15\text{ A}$ , $T_J = 125\text{ }^{\circ}\text{C}$	-	1.2	1.6	
Maximum reverse leakage current	$I_{RM}$	$V_R = V_R$ rated	-	1.0	10	$\mu\text{A}$
		$T_J = 125\text{ }^{\circ}\text{C}$ , $V_R = 0.8 \times V_R$ rated	-	400	1000	
Junction capacitance	$C_T$	$V_R = 200\text{ V}$	-	25	50	pF
Series inductance	$L_S$	Measured lead to lead 5 mm from package body	-	8	-	nH

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time See fig. 5 and 10	$t_{rr}$	$I_F = 1.0\text{ A}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	19	-	ns
	$t_{rr1}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	42	60	
	$t_{rr2}$	$T_J = 125\text{ }^{\circ}\text{C}$	-	70	120	
Peak recovery current See fig. 6	$I_{RRM1}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	4.0	6.0	A
	$I_{RRM2}$	$T_J = 125\text{ }^{\circ}\text{C}$	-	6.5	10	
Reverse recovery charge See fig. 7	$Q_{rr1}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	80	180	nC
	$Q_{rr2}$	$T_J = 125\text{ }^{\circ}\text{C}$	-	220	600	
Peak rate of fall of recovery current during $t_b$ See fig. 8	$di_{(rec)M}/dt1$	$T_J = 25\text{ }^{\circ}\text{C}$	-	250	-	A/ $\mu\text{s}$
	$di_{(rec)M}/dt2$	$T_J = 125\text{ }^{\circ}\text{C}$	-	160	-	

**THERMAL - MECHANICAL SPECIFICATIONS PER LEG**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Lead temperature	$T_{lead}$	0.063" from case (1.6 mm) for 10 s	-	-	300	$^{\circ}\text{C}$
Junction to case, single leg conducting	$R_{thJC}$				1.7	K/W
Junction to case, both legs conducting			-	-	0.85	
Thermal resistance, junction to ambient	$R_{thJA}$	Typical socket mount	-	-	40	
Thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, flat, smooth and greased	-	0.25	-	
Weight			-	6.0	-	g
			-	0.21	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-220AB	HFA30TA60CH			

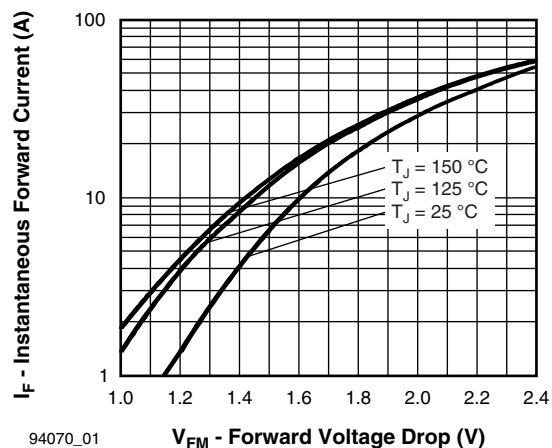


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

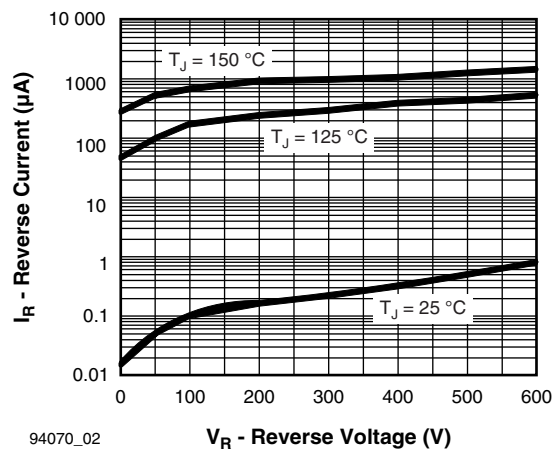


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

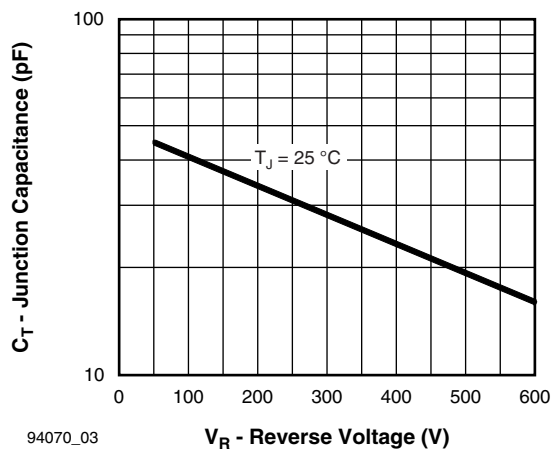


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

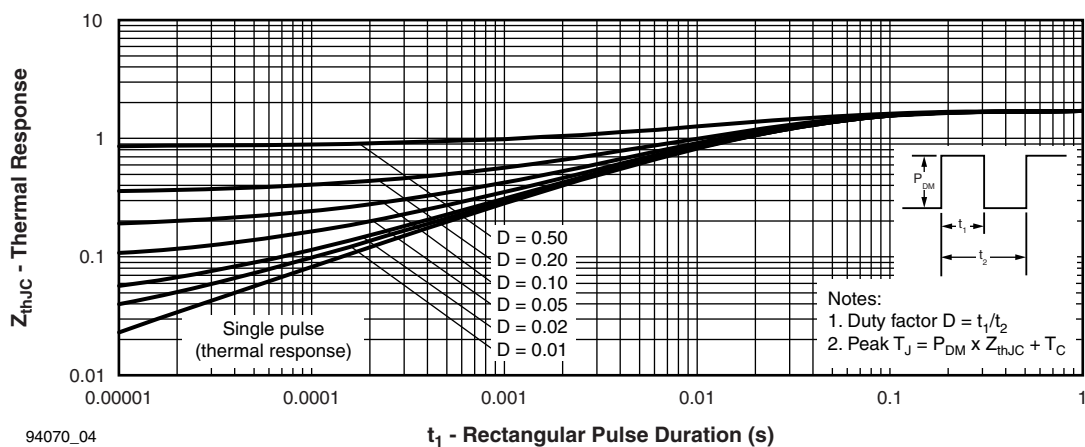
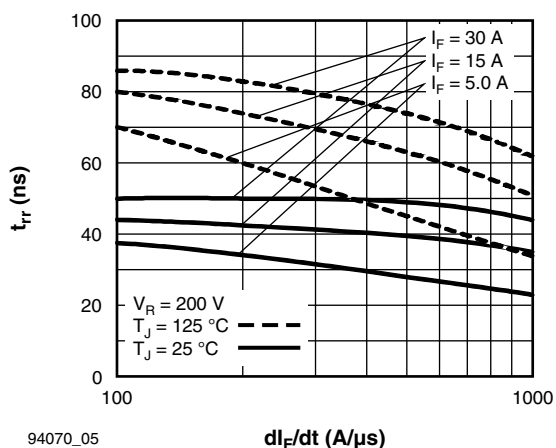
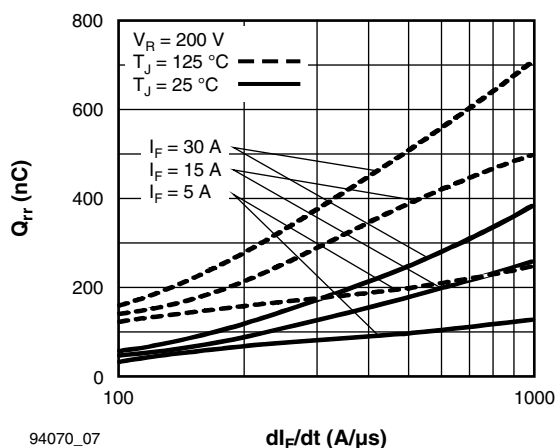


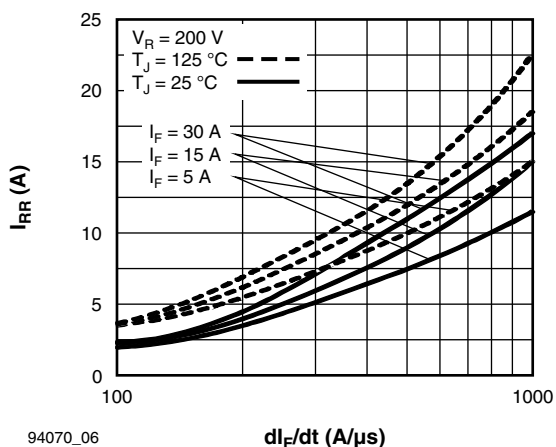
Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)



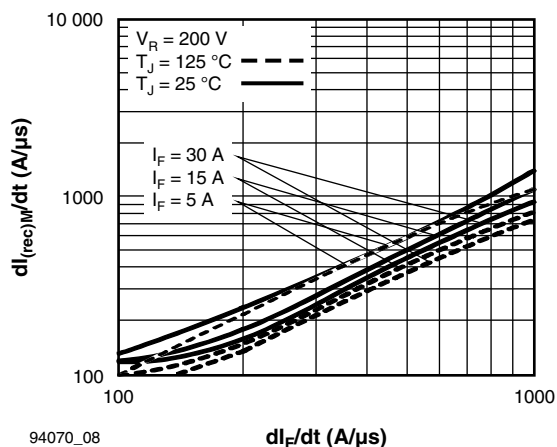
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Fig. 5 - Typical Reverse Recovery Time vs.  $dI_F/dt$  (Per Leg)


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Fig. 7 - Typical Stored Charge vs.  $dI_F/dt$  (Per Leg)


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Fig. 6 - Typical Recovery Current vs.  $dI_F/dt$  (Per Leg)


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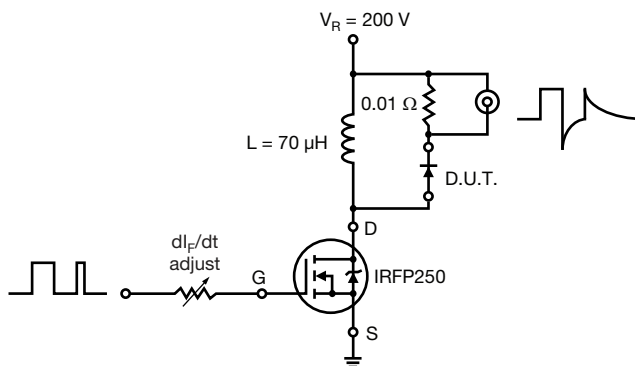
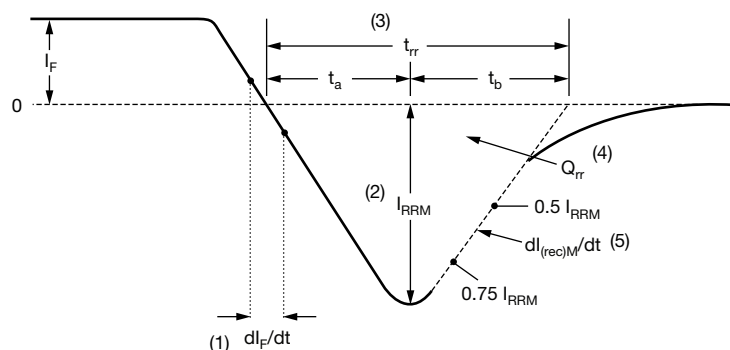
Fig. 8 - Typical  $dI_{recM}/dt$  vs.  $dI_F/dt$  (Per Leg)


Fig. 9 - Reverse Recovery Parameter Test Circuit



- (1)  $dl_F/dt$  - rate of change of current through zero crossing
- (2)  $I_{RRM}$  - peak reverse recovery current
- (3)  $t_{rr}$  - reverse recovery time measured from zero crossing point of negative going  $I_F$  to point where a line passing through  $0.75 I_{RRM}$  and  $0.50 I_{RRM}$  extrapolated to zero current.
- (4)  $Q_{rr}$  - area under curve defined by  $t_{rr}$  and  $I_{RRM}$
- (5)  $dl_{(rec)M}/dt$  - peak rate of change of current during  $t_b$  portion of  $t_{rr}$

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

Fig. 10 - Reverse Recovery Waveform and Definitions

## ORDERING INFORMATION TABLE

Device code	VS-	HF	A	30	TA	60	C	H	N3
	1	2	3	4	5	6	7	8	9
1	Vishay Semiconductors product								
2	HEXFRED® family								
3	Electron irradiated								
4	Current rating (30 = 30 A)								
5	Package: TA = TO-220AB								
6	Voltage rating (60 = 600 V)								
7	Circuit configuration: C = Common cathode								
8	H = AEC-Q101 qualified								
9	Environmental digit: N3 = Halogen-free, RoHS compliant and totally lead (Pb)-free								

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-HFA30TA60CHN3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95222">www.vishay.com/doc?95222</a>
Part marking information	TO-220AB-N3 <a href="http://www.vishay.com/doc?95028">www.vishay.com/doc?95028</a>



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