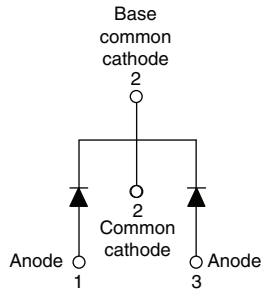


HEXFRED®

Ultrafast Soft Recovery Diode, 2 x 15 A



TO-220AB



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

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

AUTOMOTIVE GRADE


RoHS
 COMPLIANT
 HALOGEN
FREE

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.

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		600	V
Maximum continuous forward current	I_F	$T_C = 100\text{ °C}$	per leg 15	A
			per device 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}	$I_R = 100\ \mu\text{A}$	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	μA
		$T_J = 125\text{ }^\circ\text{C}, V_R = 0.8 \times V_R$ 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	-	$\text{A}/\mu\text{s}$
	$di_{(rec)M}/dt2$	$T_J = 125\text{ }^\circ\text{C}$	-	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)	$\text{kgf} \cdot \text{cm}$ ($\text{lb} \cdot \text{in}$)
Marking device		Case style TO-220AB	HFA30TA60CH			

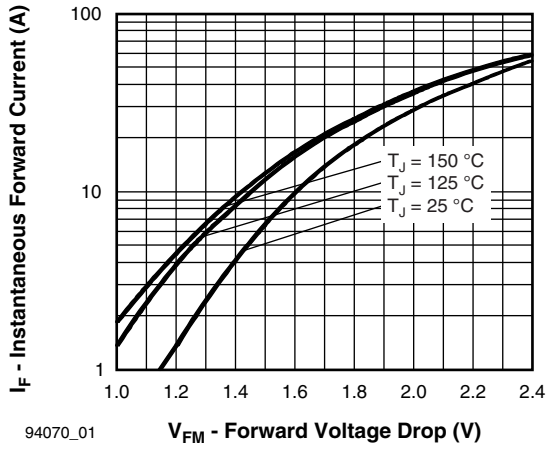


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

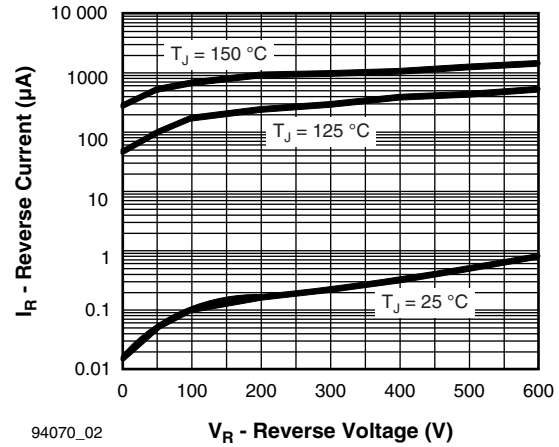


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

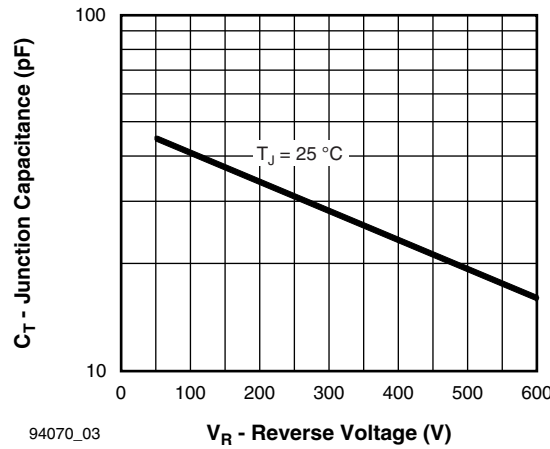


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

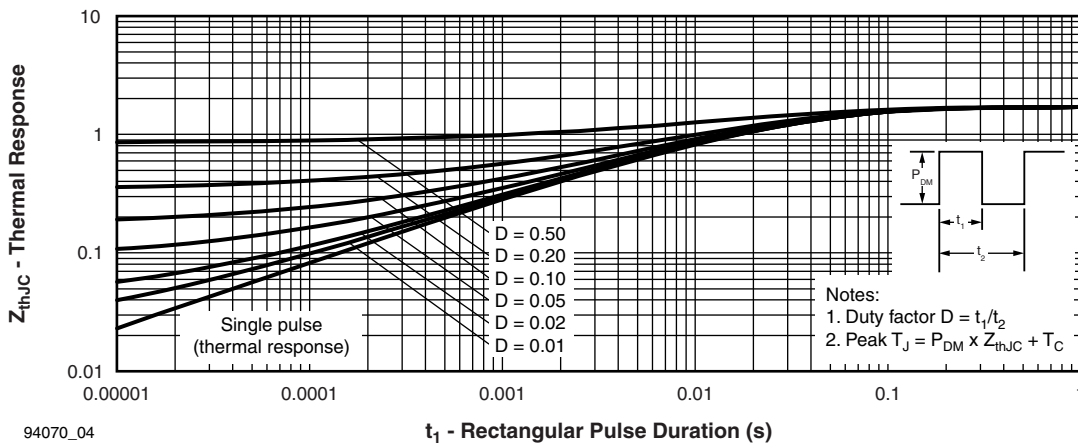
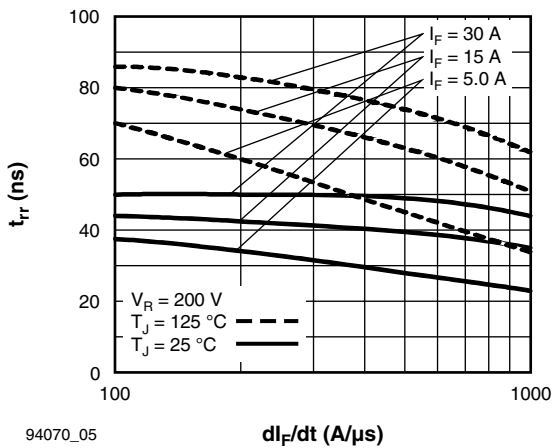
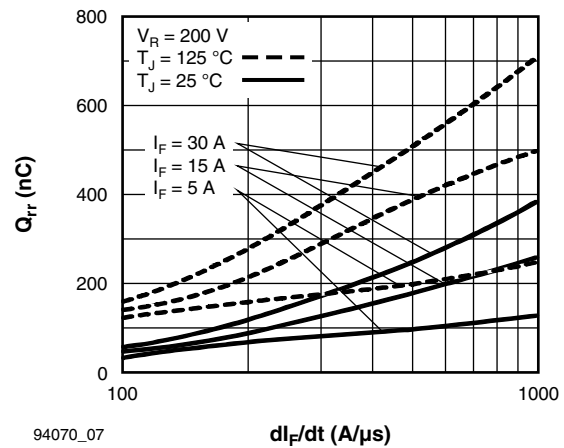


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)



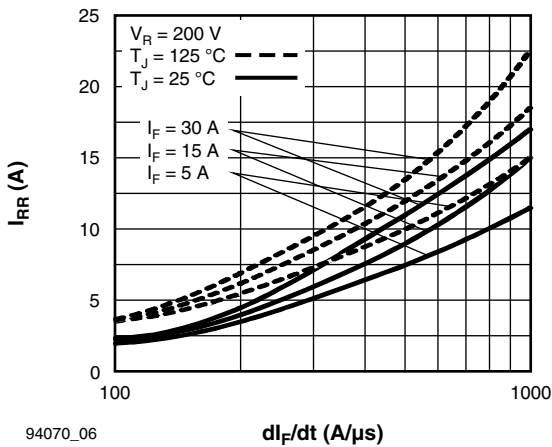
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Fig. 5 - Typical Reverse Recovery Time vs. di_F/dt (Per Leg)



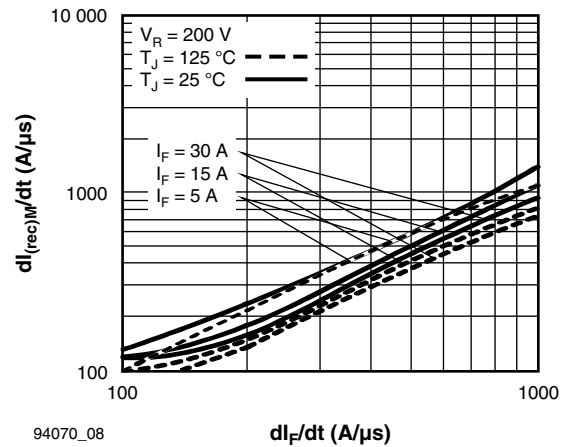
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Fig. 7 - Typical Stored Charge vs. di_F/dt (Per Leg)



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



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Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_F/dt (Per Leg)

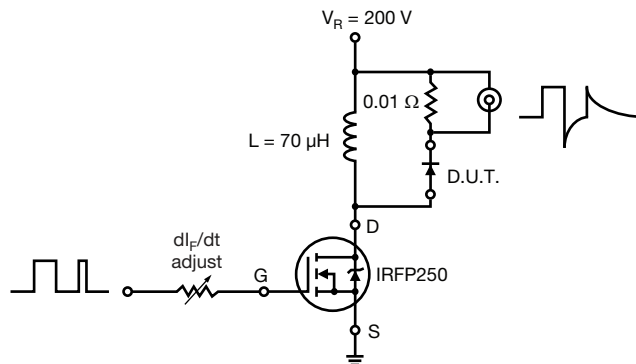
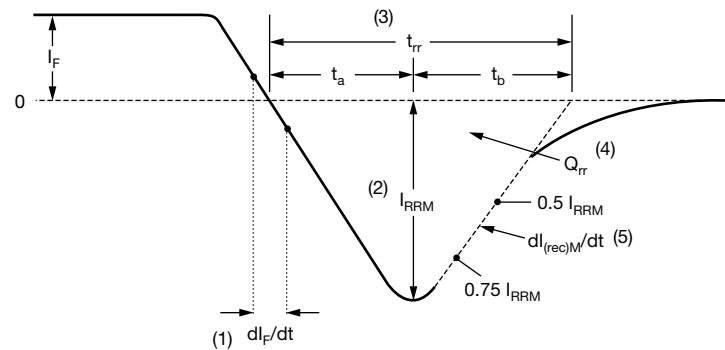


Fig. 9 - Reverse Recovery Parameter Test Circuit



- (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}
- $$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$
- (5) $dl_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

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	www.vishay.com/doc?95222
Part marking information	TO-220AB-N3 www.vishay.com/doc?95028



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