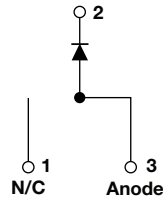


HEXFRED®

Ultrafast Soft Recovery Diode, 6 A


D²PAK

FEATURES

- Ultrafast recovery
- Ultrasoft recovery
- Very low I_{RRM}
- Very low Q_{rr}
- Specified at operating conditions
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Halogen-free according to IEC 61249-2-21 definition
- Compliant to RoHS directive 2002/95/EC
- AEC-Q101 qualified


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-HFA06TB120S 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 1200 V and 6 A continuous current, the VS-HFA06TB120S 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-HFA06TB120S 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

V_R	1200 V
V_F at 6 A at 25 °C	3.0 V
$I_{F(AV)}$	6 A
t_{rr} (typical)	26 ns
T_J (maximum)	150 °C
Q_{rr} (typical)	116 nC
$dI_{(rec)M}/dt$ (typical) at 125 °C	100 A/ μ s
I_{RRM} (typical)	4.4 A

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		1200	V
Maximum continuous forward current	I_F	$T_C = 100\text{ °C}$	6	A
Single pulse forward current	I_{FSM}		80	
Maximum repetitive forward current	I_{FRM}		24	
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$	62.5	W
		$T_C = 100\text{ °C}$	25	
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}	$I_R = 100\text{ }\mu\text{A}$	1200	-	-	V
Maximum forward voltage	V_{FM}	$I_F = 6.0\text{ A}$	-	2.7	3.0	
		$I_F = 12\text{ A}$	-	3.5	3.9	
		$I_F = 6.0\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	2.4	2.8	
Maximum reverse leakage current	I_{RM}	$V_R = V_R\text{ rated}$	-	0.26	5.0	μA
		$T_J = 125\text{ }^\circ\text{C}, V_R = 0.8 \times V_R\text{ rated}$	-	110	500	
Junction capacitance	C_T	$V_R = 200\text{ V}$	-	9.0	14	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	t_{rr}	$I_F = 1.0\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	26	-	ns
	t_{rr1}	$T_J = 25\text{ }^\circ\text{C}$	-	53	80	
	t_{rr2}	$T_J = 125\text{ }^\circ\text{C}$	-	87	130	
Peak recovery current	I_{RRM1}	$T_J = 25\text{ }^\circ\text{C}$	-	4.4	8.0	A
	I_{RRM2}	$T_J = 125\text{ }^\circ\text{C}$	-	5.0	9.0	
Reverse recovery charge	Q_{rr1}	$T_J = 25\text{ }^\circ\text{C}$	-	116	320	nC
	Q_{rr2}	$T_J = 125\text{ }^\circ\text{C}$	-	233	585	
Peak rate of recovery current during t_b	$di_{(rec)M}/dt1$	$T_J = 25\text{ }^\circ\text{C}$	-	180	-	$\text{A}/\mu\text{s}$
	$di_{(rec)M}/dt2$	$T_J = 125\text{ }^\circ\text{C}$	-	100	-	

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}		-	-	2.0	K/W
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	80	
Thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth and greased	-	0.5	-	
Weight			-	2.0	-	g
			-	0.07	-	oz.

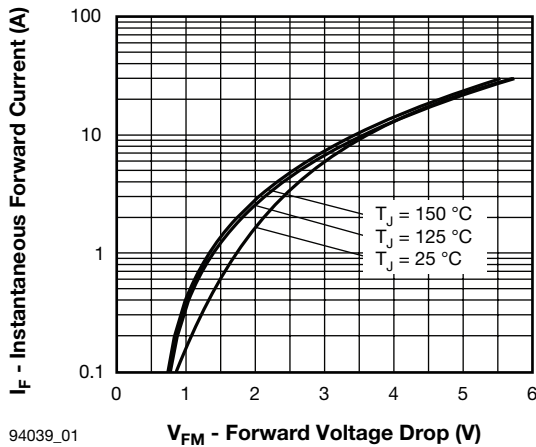


Fig. 1 - Typical Forward Voltage Drop Characteristics

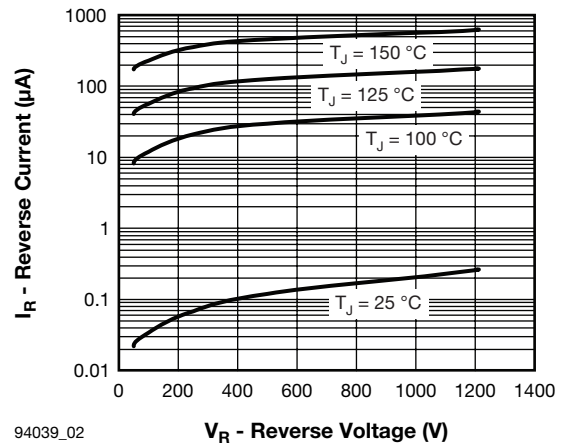


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

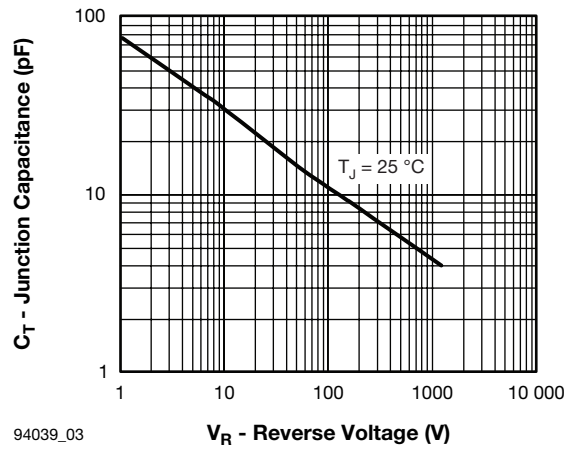


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

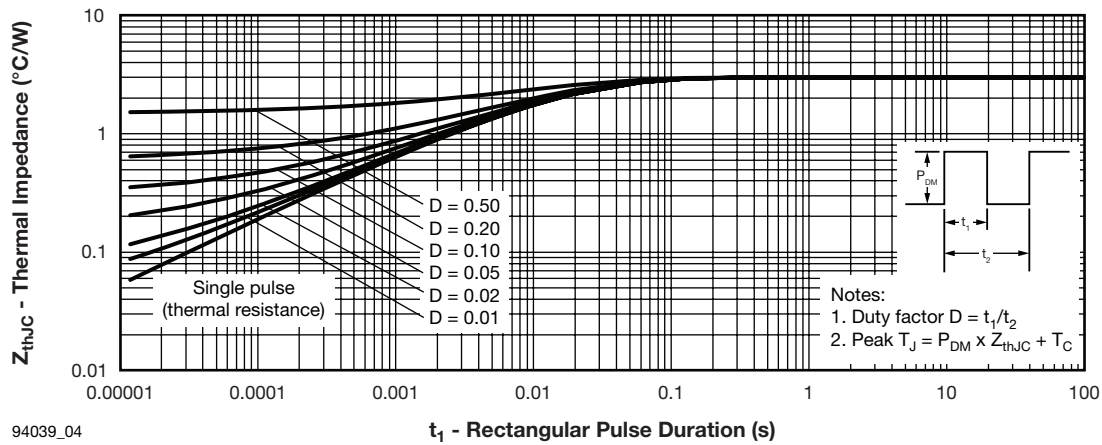


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

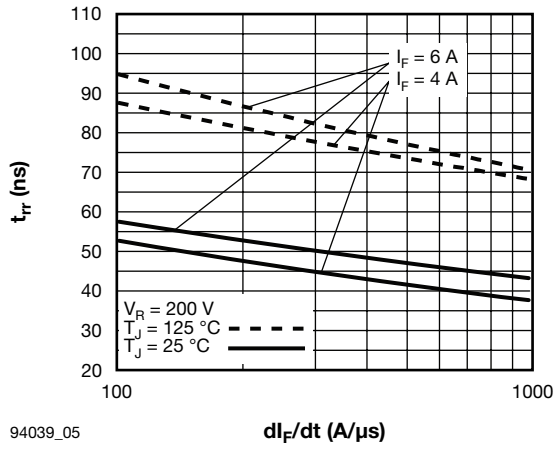


Fig. 5 - Typical Reverse Recovery Time vs. di_F/dt

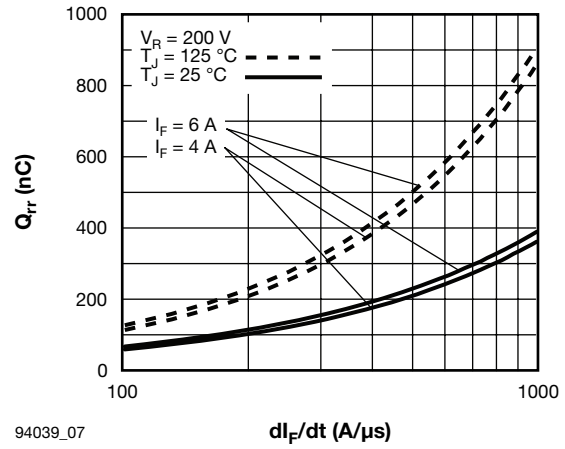


Fig. 7 - Typical Stored Charge vs. di_F/dt

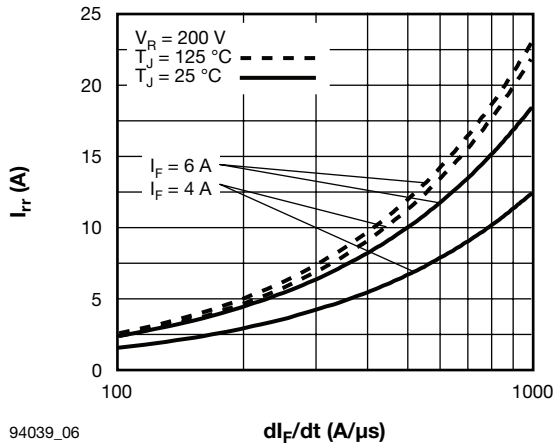


Fig. 6 - Typical Recovery Current vs. di_F/dt

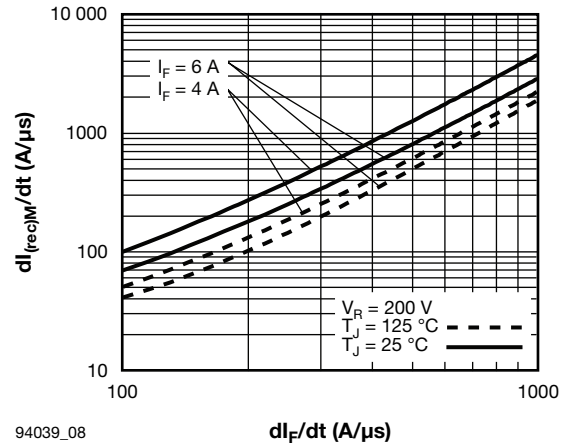


Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. di_F/dt

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Vishay High Power Products

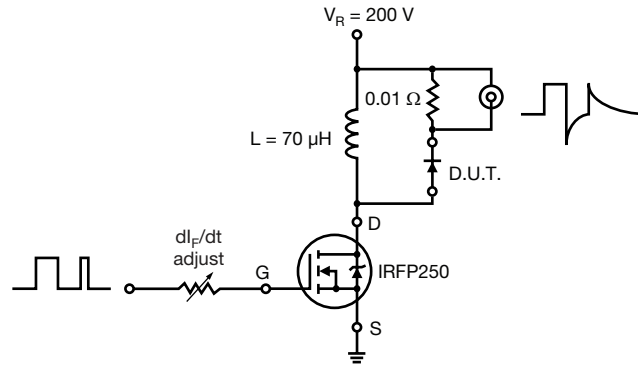
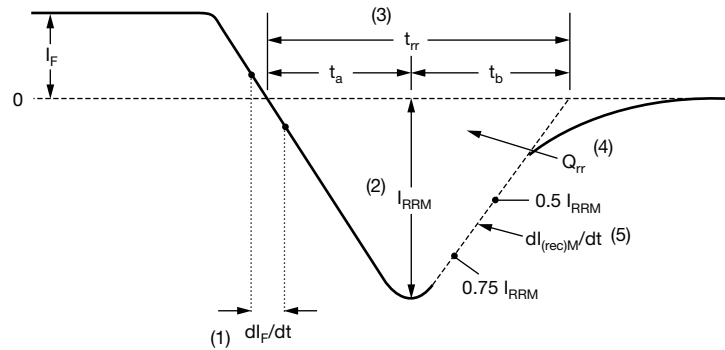


Fig. 9 - Reverse Recovery Parameter Test Circuit


 (1) di_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 $0.5 I_{RRM}$ 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) $dI_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 10 - Reverse Recovery Waveform and Definitions

VS-HFA06TB120SPbF



Vishay High Power Products

HEXFRED®
Ultrafast Soft Recovery Diode, 6 A

ORDERING INFORMATION TABLE

Device code	VS-	HF	A	06	TB	120	S	TRL	PbF
	①	②	③	④	⑤	⑥	⑦	⑧	⑨

- 1** - HPP product suffix
- 2** - HEXFRED® family
- 3** - Process designator: A = Electron irradiated
- 4** - Current rating (06 = 6 A)
- 5** - Package outline (TB = TO-220, 2 leads)
- 6** - Voltage rating (120 = 1200 V)
- 7** - S = D²PAK
- 8** -
 - None = Tube (50 pieces)
 - TRL = Tape and reel (left oriented)
 - TRR = Tape and reel (right oriented)
- 9** - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95046
Part marking information	www.vishay.com/doc?95054
Packaging information	www.vishay.com/doc?95032



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