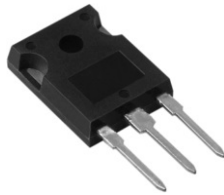
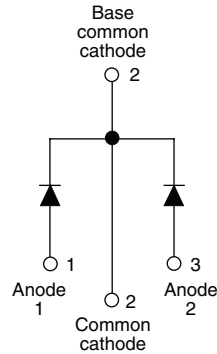


HEXFRED®

Ultrafast, Soft Recovery Diode, 2 x 25 A



TO-247AC



FEATURES

- Ultrafast recovery
- Ultrasoft recovery
- Very low I_{RRM}
- Very low Q_{rr}
- Specified at operating conditions
- Designed and qualified for industrial level

BENEFITS

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

DESCRIPTION

HFA50PA60C 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 25 A per leg continuous current, the HFA50PA60C 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 HFA50PA60C 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	600 V
V_F at 25 A at 25 °C	1.7 V
$I_{F(AV)}$	2 x 25 A
t_{rr} (typical)	23 ns
T_J (maximum)	150 °C
Q_{rr} (typical)	112 nC
$dI_{(rec)M}/dt$ (typical) at 125 °C	160 A/μs
I_{RRM} (typical)	4.5 A

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	V_R		600	V
Maximum continuous forward current — per leg	I_F	$T_C = 100\text{ °C}$	25	A
per device			50	
Single pulse forward current	I_{FSM}		225	
Maximum repetitive forward current	I_{FRM}		100	
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$	150	W
		$T_C = 100\text{ °C}$	60	
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}	$I_F = 25\text{ A}$	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 μA
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		-	12	- 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, 10	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. 6	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. 7	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. 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						
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}			-	-	0.83
Junction to case, both legs conducting				-	-	0.42
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount		-	-	40 K/W
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) $\text{kgf} \cdot \text{cm}$ ($\text{lbf} \cdot \text{in}$)
Marking device		Case style TO-247AC		HFA50PA60C		

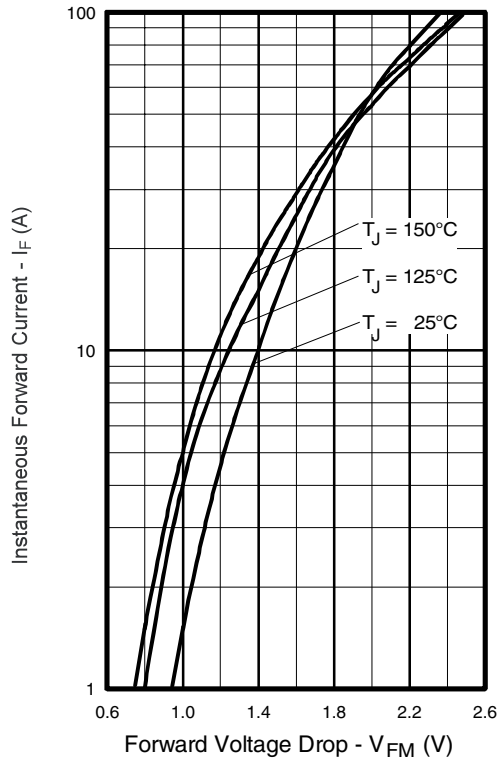


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

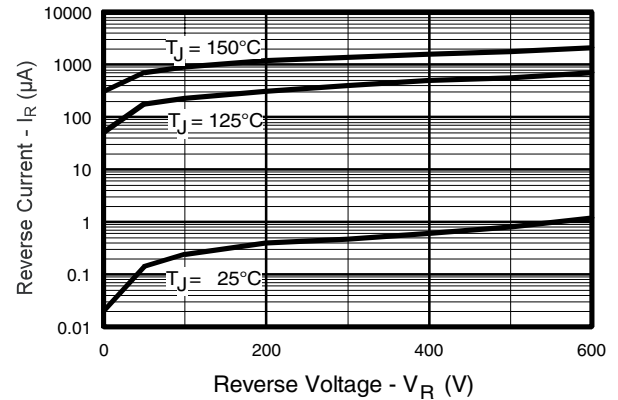


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

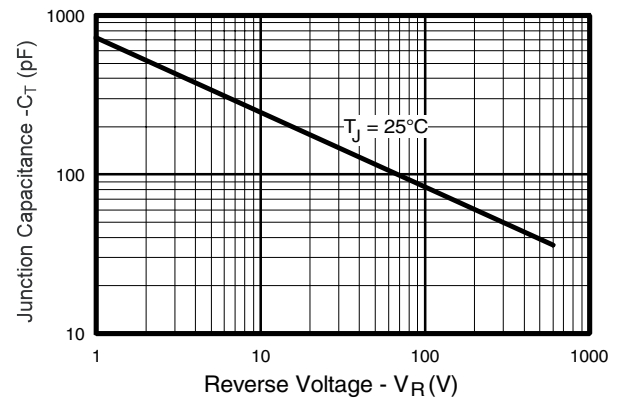


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

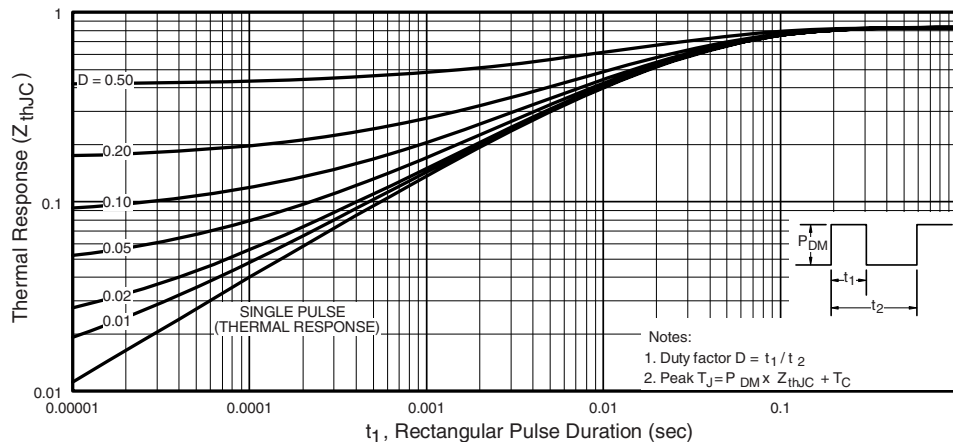


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

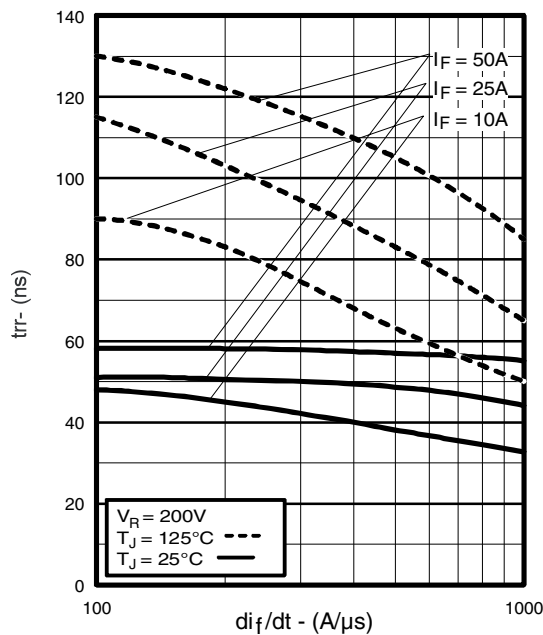


Fig. 5 - Typical Reverse Recovery Time vs. di_F/dt (Per Leg)

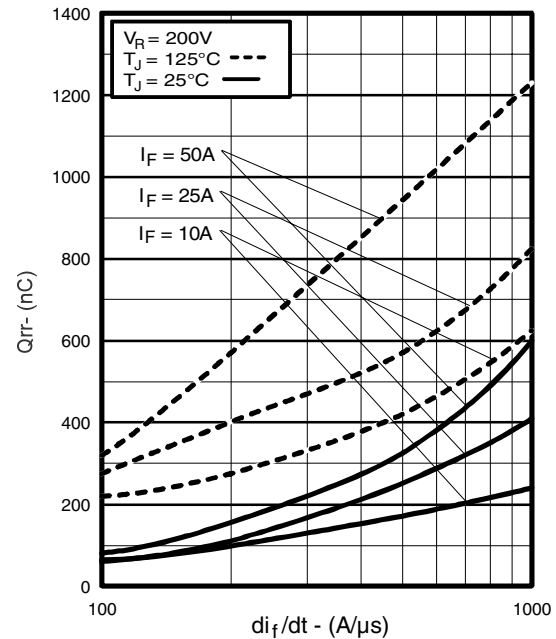


Fig. 7 - Typical Stored Charge vs. di_F/dt (Per Leg)

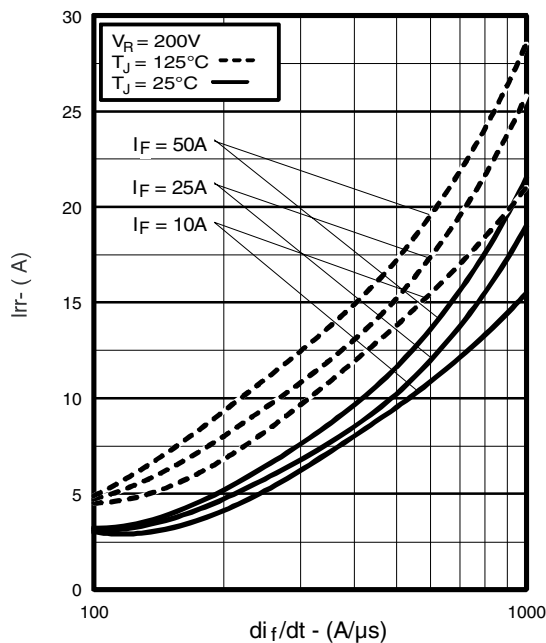


Fig. 6 - Typical Recovery Current vs. di_F/dt (Per Leg)

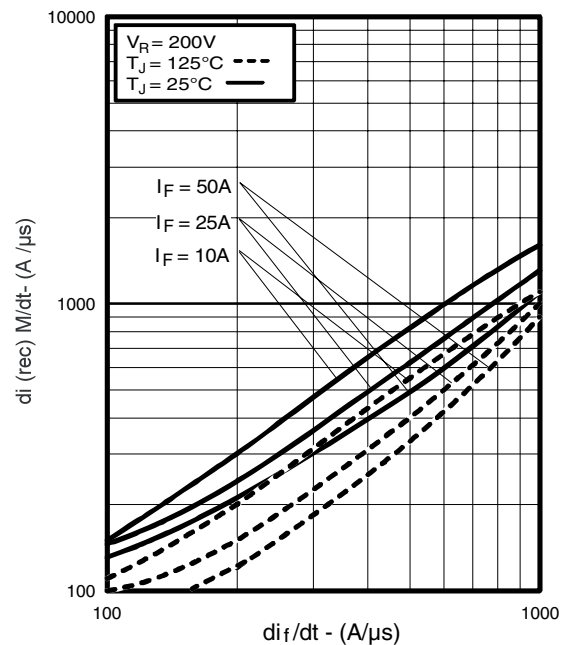


Fig. 8 - Typical $dI_{(rec)}M/dt$ vs. di_F/dt (Per Leg)

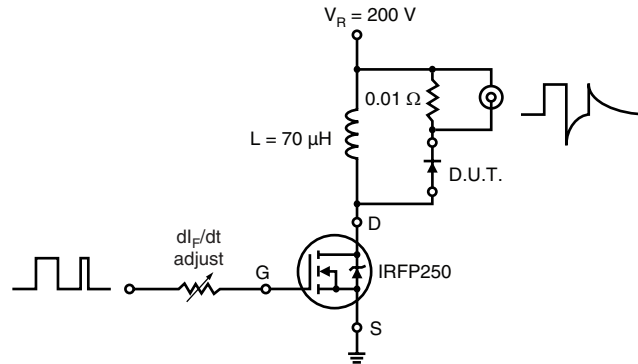


Fig. 9 - Reverse Recovery Parameter Test Circuit

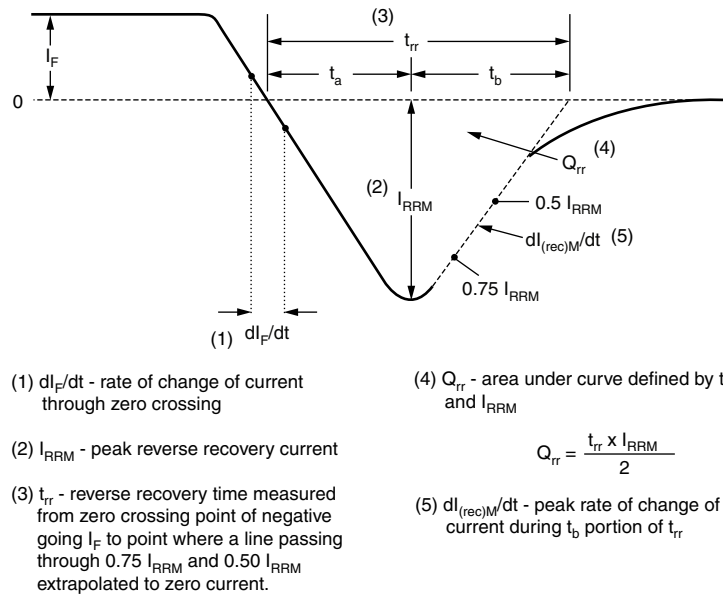


Fig. 10 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

Device code	HF	A	50	PA	60	C	-
	1	2	3	4	5	6	7

- 1** - HEXFRED® family
- 2** - Process designator: A = Subs. electron irradiated
B = Subs. platinum
- 3** - Current rating (50 = 50 A)
- 4** - Package outline (PA = TO-247, 3 pins)
- 5** - Voltage rating (60 = 600 V)
- 6** - Configuration (C = Center tap common cathode)
- 7** -
 - None = Standard production
 - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	http://www.vishay.com/doc?95223
Part marking information	http://www.vishay.com/doc?95226



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