

# HiPerFRED

$V_{RRM} = 400\text{ V}$   
 $I_{FAV} = 2 \times 120\text{ A}$   
 $t_{rr} = 30\text{ ns}$

High Performance Fast Recovery Diode  
 Low Loss and Soft Recovery  
 Parallel legs

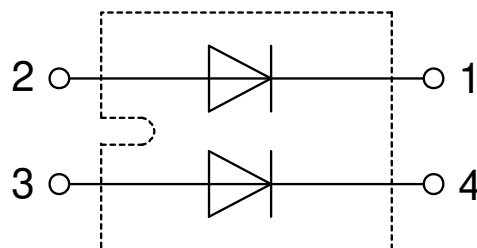
Part number

**DPF240X400NA**



Backside: isolated

 E72873



### Features / Advantages:

- Planar passivated chips
- Very low leakage current
- Very short recovery time
- Improved thermal behaviour
- Very low  $I_{rm}$ -values
- Very soft recovery behaviour
- Avalanche voltage rated for reliable operation
- Soft reverse recovery for low EMI/RFI
- Low  $I_{rm}$  reduces:
  - Power dissipation within the diode
  - Turn-on loss in the commutating switch

### Applications:

- Antiparallel diode for high frequency switching devices
- Antisaturation diode
- Snubber diode
- Free wheeling diode
- Rectifiers in switch mode power supplies (SMPS)
- Uninterruptible power supplies (UPS)

### Package: SOT-227B (minibloc)

- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate: Copper internally DCB isolated
- Advanced power cycling

### Disclaimer Notice

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Fast Diode				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM}$	max. non-repetitive reverse blocking voltage					400	V
$V_{RRM}$	max. repetitive reverse blocking voltage					400	V
$I_R$	reverse current, drain current	$V_R = 400\text{ V}$		$T_{VJ} = 25^\circ\text{C}$		10	$\mu\text{A}$
		$V_R = 400\text{ V}$		$T_{VJ} = 150^\circ\text{C}$		0.5	mA
$V_F$	forward voltage drop	$I_F = 120\text{ A}$		$T_{VJ} = 25^\circ\text{C}$		1.25	V
		$I_F = 240\text{ A}$				1.54	V
		$I_F = 120\text{ A}$		$T_{VJ} = 150^\circ\text{C}$		1.06	V
		$I_F = 240\text{ A}$				1.42	V
$I_{FAV}$	average forward current	$T_C = 70^\circ\text{C}$		$T_{VJ} = 150^\circ\text{C}$		120	A
		rectangular	$d = 0.5$				
$V_{FO}$	threshold voltage	} for power loss calculation only				0.71	V
$r_F$	slope resistance					2.9	m $\Omega$
$R_{thJC}$	thermal resistance junction to case					0.5	K/W
$R_{thCH}$	thermal resistance case to heatsink					0.1	K/W
$P_{tot}$	total power dissipation			$T_C = 25^\circ\text{C}$		250	W
$I_{FSM}$	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$		$T_{VJ} = 45^\circ\text{C}$		1.20	kA
$C_J$	junction capacitance	$V_R = 200\text{ V}$ $f = 1\text{ MHz}$		$T_{VJ} = 25^\circ\text{C}$		187	pF
$I_{RM}$	max. reverse recovery current	} $I_F = 120\text{ A}; V_R = 240\text{ V}$		$T_{VJ} = 25^\circ\text{C}$		7	A
				$T_{VJ} = 125^\circ\text{C}$		18	A
$t_{rr}$	reverse recovery time	} $-di_F/dt = 200\text{ A}/\mu\text{s}$		$T_{VJ} = 25^\circ\text{C}$		30	ns
				$T_{VJ} = 125^\circ\text{C}$		140	ns



Package SOT-227B (minibloc)				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$I_{RMS}$	RMS current	per terminal			150	A	
$T_{VJ}$	virtual junction temperature		-40		150	°C	
$T_{op}$	operation temperature		-40		125	°C	
$T_{stg}$	storage temperature		-40		150	°C	
<b>Weight</b>					30	g	
$M_D$	mounting torque		1.1		1.5	Nm	
$M_T$	terminal torque		1.1		1.5	Nm	
$d_{Spp/App}$	creepage distance on surface   striking distance through air	terminal to terminal	10.5	3.2		mm	
$d_{Spb/Apb}$		terminal to backside	8.6	6.8		mm	
$V_{ISOL}$	isolation voltage	t = 1 second		3000		V	
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	2500		V	

**Product Marking**



**Part description**

- D = Diode
- P = HiPerFRED
- F = ultra fast
- 240 = Current Rating [A]
- X = Parallel legs
- 400 = Reverse Voltage [V]
- NA = SOT-227B (minibloc)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	DPF240X400NA	DPF240X400NA	Tube	10	499554

**Equivalent Circuits for Simulation**

\* on die level

$T_{VJ} = 150^{\circ}C$



**Fast Diode**

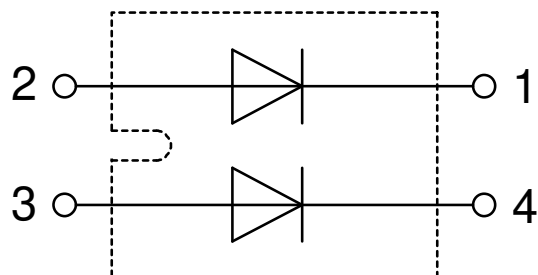
$V_{0\ max}$	threshold voltage	0.71	V
$R_{0\ max}$	slope resistance *	1.01	mΩ



**Outlines SOT-227B (minibloc)**



Dim.	Millimeter		Inches	
	min	max	min	max
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	37.80	38.23	1.488	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.74	0.84	0.029	0.033
M	12.50	13.10	0.492	0.516
N	25.15	25.42	0.990	1.001
O	1.95	2.13	0.077	0.084
P	4.95	6.20	0.195	0.244
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.167
S	4.55	4.85	0.179	0.191
T	24.59	25.25	0.968	0.994
U	-0.05	0.10	-0.002	0.004
V	3.20	5.50	0.126	0.217
W	19.81	21.08	0.780	0.830
Z	2.50	2.70	0.098	0.106



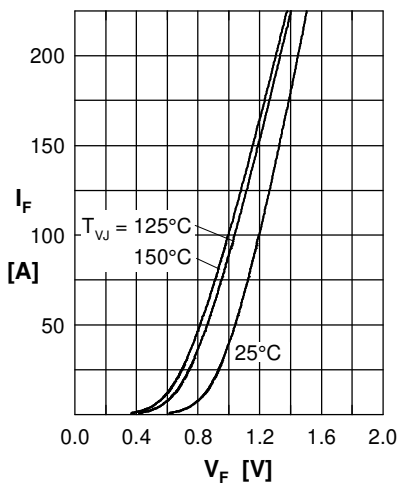
**Fast Diode**


Fig. 1 Forward current  $I_F$  vs.  $V_F$

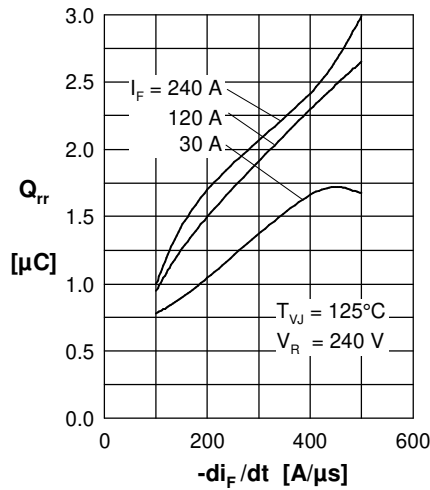


Fig. 2 Typ. reverse recovery charge  $Q_{rr}$  vs.  $-di_F/dt$

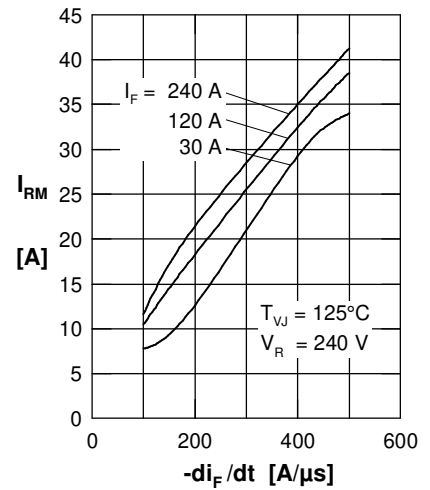


Fig. 3 Typ. reverse recovery current  $I_{RM}$  vs.  $-di_F/dt$

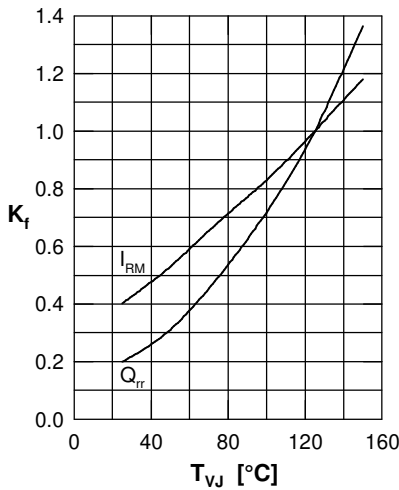


Fig. 4 Typ. dynamic parameters  $Q_{rr}$ ,  $I_{RM}$  vs.  $T_{VJ}$

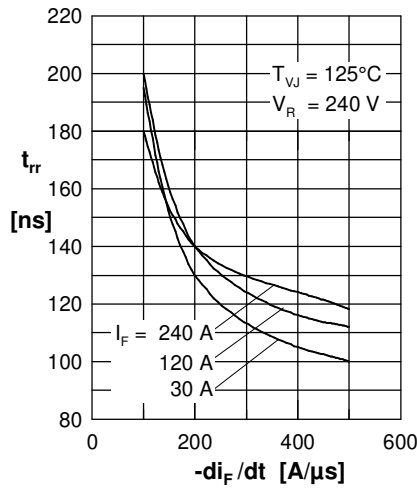


Fig. 5 Typ. reverse recovery time  $t_{rr}$  vs.  $-di_F/dt$

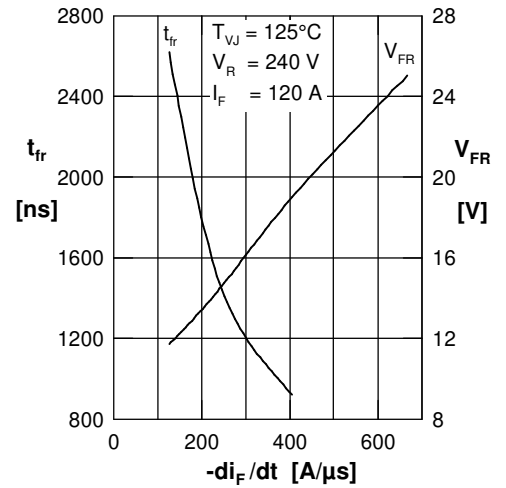


Fig. 6 Typ. forward recovery voltage  $V_{FR}$  &  $t_{fr}$  vs.  $di_F/dt$

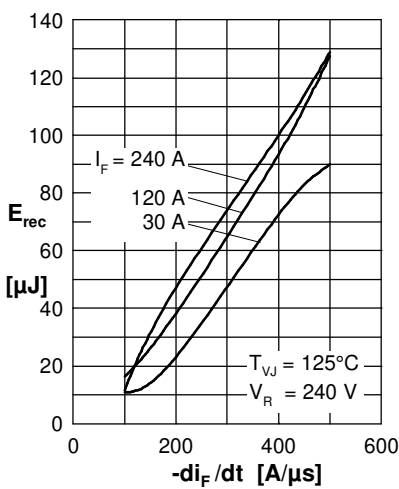


Fig. 7 Typ. recovery energy  $E_{rec}$  vs.  $-di_F/dt$

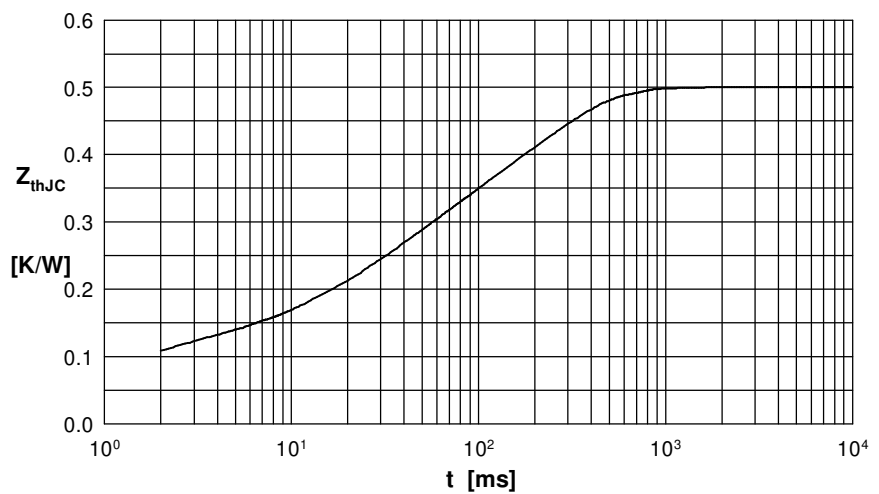


Fig. 8 Transient thermal impedance junction to case