

# HiPerFRED

$V_{RRM} = 1200\text{ V}$   
 $I_{FAV} = 2 \times 60\text{ A}$   
 $t_{rr} = 40\text{ ns}$


High Performance Fast Recovery Diode  
 Low Loss and Soft Recovery  
 Anti-parallel legs

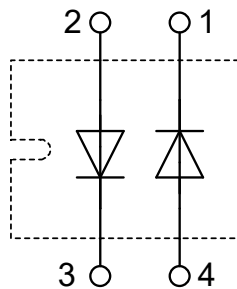
Part number

**DSEP2x60-12A**



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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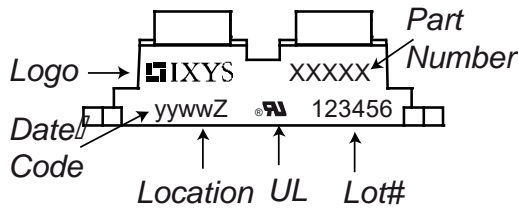


Fast Diode				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM}$	max. non-repetitive reverse blocking voltage					1200	V
$V_{RRM}$	max. repetitive reverse blocking voltage					1200	V
$I_R$	reverse current, drain current	$V_R = 1200\text{ V}$		$T_{VJ} = 25^\circ\text{C}$		1	mA
		$V_R = 1200\text{ V}$		$T_{VJ} = 150^\circ\text{C}$		4	mA
$V_F$	forward voltage drop	$I_F = 60\text{ A}$		$T_{VJ} = 25^\circ\text{C}$		2,42	V
		$I_F = 120\text{ A}$				2,84	V
		$I_F = 60\text{ A}$		$T_{VJ} = 150^\circ\text{C}$		1,52	V
		$I_F = 120\text{ A}$				1,92	V
$I_{FAV}$	average forward current	$T_c = 80^\circ\text{C}$		$T_{VJ} = 150^\circ\text{C}$		60	A
		rectangular	$d = 0.5$				
$V_{F0}$	threshold voltage			$T_{VJ} = 150^\circ\text{C}$		1,15	V
$r_F$	slope resistance					6,2	mΩ
						} for power loss calculation only	
$R_{thJC}$	thermal resistance junction to case					0,6	K/W
$R_{thCH}$	thermal resistance case to heatsink				0,1		K/W
$P_{tot}$	total power dissipation			$T_c = 25^\circ\text{C}$		200	W
$I_{FSM}$	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$		$T_{VJ} = 45^\circ\text{C}$		800	A
$C_J$	junction capacitance	$V_R = 600\text{ V}$ $f = 1\text{ MHz}$		$T_{VJ} = 25^\circ\text{C}$		48	pF
$I_{RM}$	max. reverse recovery current			$T_{VJ} = 25^\circ\text{C}$		13	A
				$T_{VJ} = 100^\circ\text{C}$		20	A
$t_{rr}$	reverse recovery time			$T_{VJ} = 25^\circ\text{C}$		85	ns
				$T_{VJ} = 100^\circ\text{C}$		250	ns



Package SOT-227B (minibloc)				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$I_{RMS}$	RMS current	per terminal			100	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**



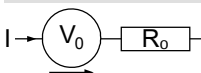
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	DSEP2x60-12A	DSEP2x60-12A	Tube	10	495840

Similar Part	Package	Voltage class
DSEP2x61-12A	SOT-227B (minibloc)	1200

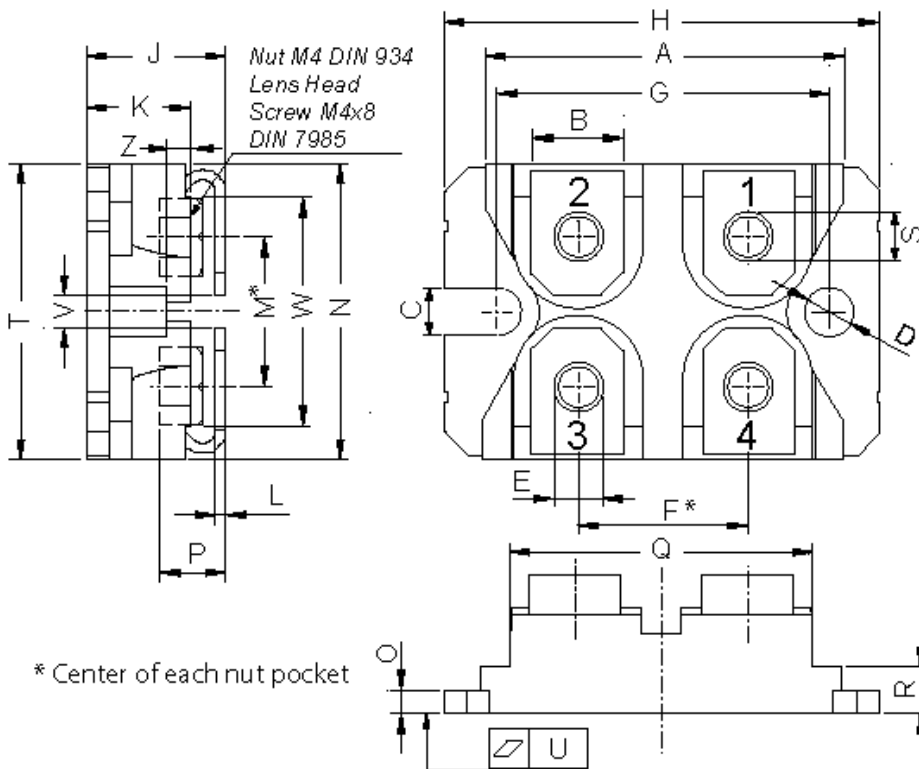
**Equivalent Circuits for Simulation**

\* on die level

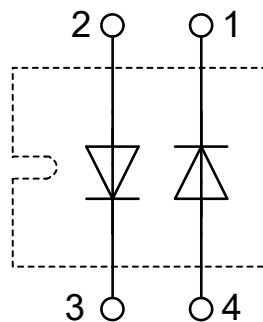
$T_{VJ} = 150^{\circ}C$



Symbol	Definition	Value	Unit
$V_{0\ max}$	threshold voltage	1,15	V
$R_{0\ max}$	slope resistance *	4,3	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



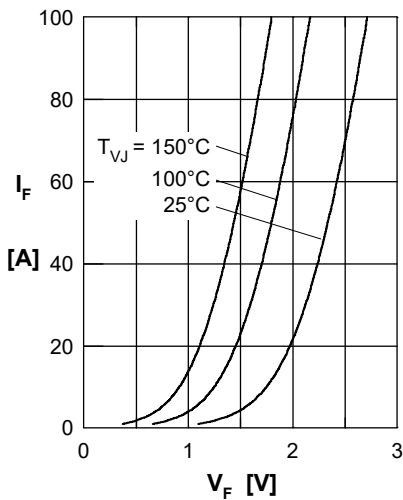
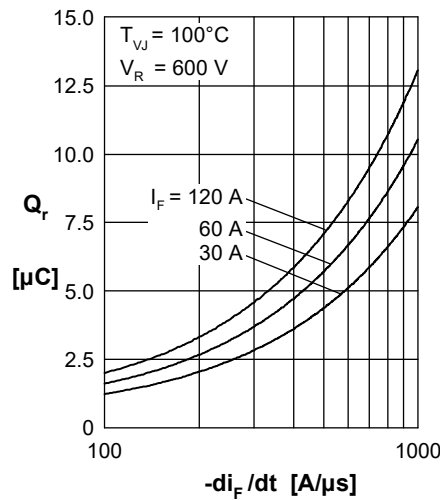
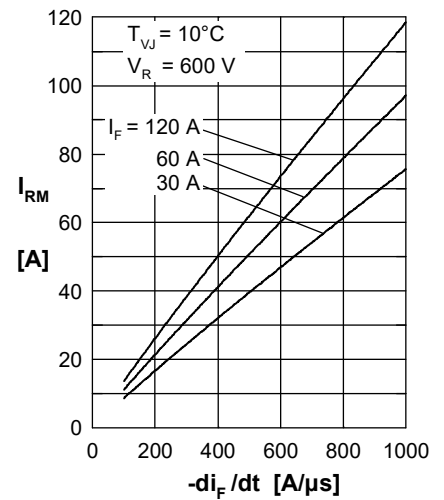
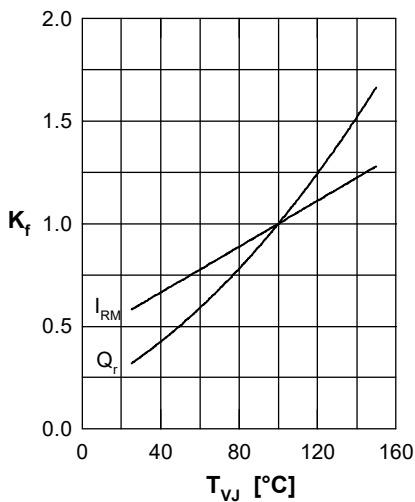
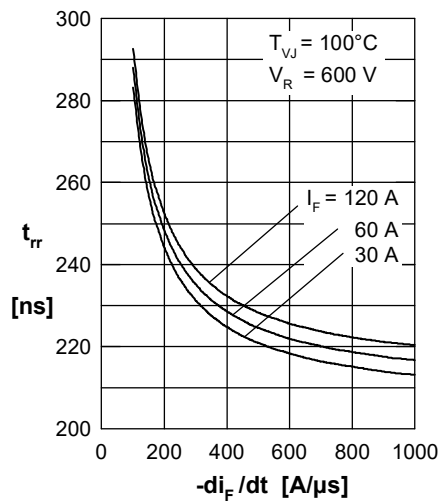
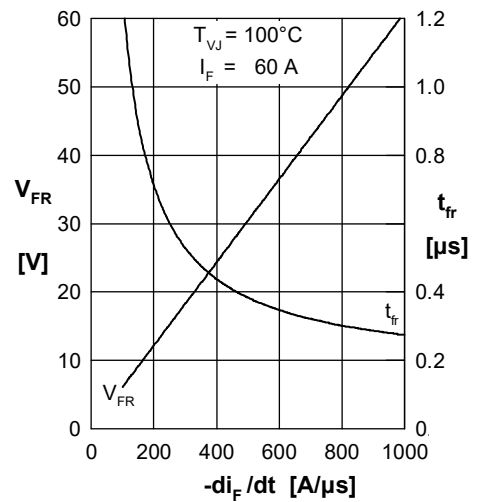
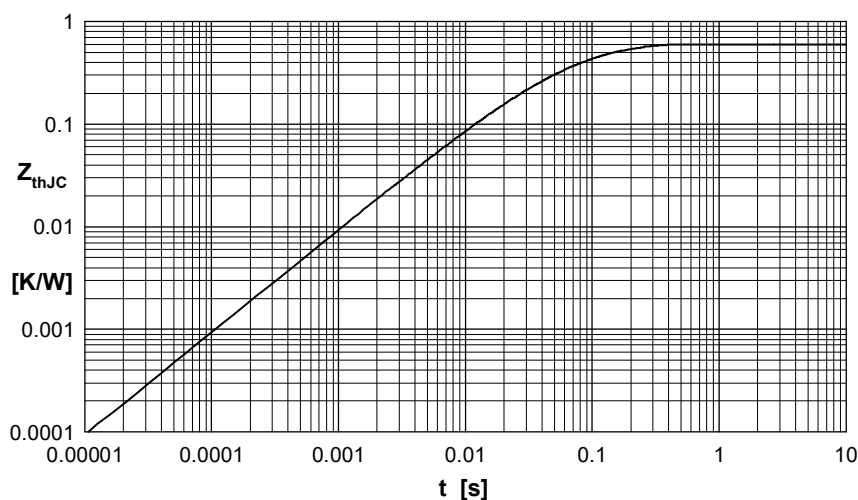
**Fast Diode**

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

 Fig. 2 Typ. reverse recov.charge  $Q_r$  versus  $-di_F/dt$ 

 Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$ 

 Fig. 4 Typ. dynamic parameters  $Q_r, I_{RM}$  versus  $T_{VJ}$ 

 Fig. 5 Typ. recovery time  $t_{tr}$  versus  $-di_F/dt$ 

 Fig. 6 Typ. peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$ 


Fig. 7 Transient thermal resistance junction to case

 Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.212	0.0055
2	0.248	0.0092
3	0.063	0.0007
4	0.077	0.0391