



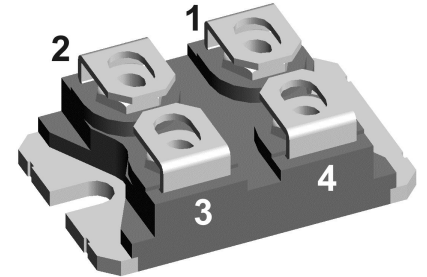
FRED

$V_{RRM} = 600\text{ V}$
 $I_{FAV} = 2 \times 125\text{ A}$
 $t_{rr} = 35\text{ ns}$

Parallel legs

Part number

DFE250X600NA



Backside: Isolated



Features / Advantages:

- Planar passivated chips
- 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

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Fast Diode				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage					600	V
V_{RRM}	max. repetitive reverse blocking voltage					600	V
I_R	reverse current, drain current	$V_R = 600\text{ V}$		$T_{VJ} = 25^\circ\text{C}$		3	mA
		$V_R = 480\text{ V}$		$T_{VJ} = 125^\circ\text{C}$		20	mA
V_F	forward voltage drop	$I_F = 125\text{ A}$		$T_{VJ} = 25^\circ\text{C}$		1.26	V
		$I_F = 250\text{ A}$				1.46	V
		$I_F = 125\text{ A}$		$T_{VJ} = 150^\circ\text{C}$		1.16	V
		$I_F = 250\text{ A}$				1.52	V
I_{FAV}	average forward current	$T_C = 80^\circ\text{C}$		$T_{VJ} = 150^\circ\text{C}$		125	A
		rectangular	$d = 0.5$				
V_{FO}	threshold voltage	} for power loss calculation only				0.81	V
r_F	slope resistance					2.9	mΩ
R_{thJC}	thermal resistance junction to case					0.4	K/W
R_{thCH}	thermal resistance case to heatsink			0.10			K/W
P_{tot}	total power dissipation			$T_C = 25^\circ\text{C}$		312	W
I_{FSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$		$T_{VJ} = 45^\circ\text{C}$		1.30	kA
C_J	junction capacitance	$V_R = 400\text{ V}$ $f = 1\text{ MHz}$		$T_{VJ} = 25^\circ\text{C}$		107	pF
I_{RM}	max. reverse recovery current	} $I_F = 100\text{ A}; V_R = 300\text{ V}$		$T_{VJ} = 25^\circ\text{C}$		27	A
				$T_{VJ} = 125^\circ\text{C}$		40	A
t_{rr}	reverse recovery time	} $-di_F/dt = 600\text{ A}/\mu\text{s}$		$T_{VJ} = 25^\circ\text{C}$		80	ns
				$T_{VJ} = 125^\circ\text{C}$		150	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
Weight				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

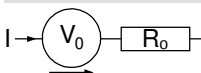
- D = Diode
- F = FRED
- E = fast, low VF
- 250 = Current Rating [A]
- X = Parallel legs
- 600 = Reverse Voltage [V]
- NA = SOT-227B (minibloc)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	DFE250X600NA	DFE250X600NA	Tube	10	524065

Equivalent Circuits for Simulation

* on die level

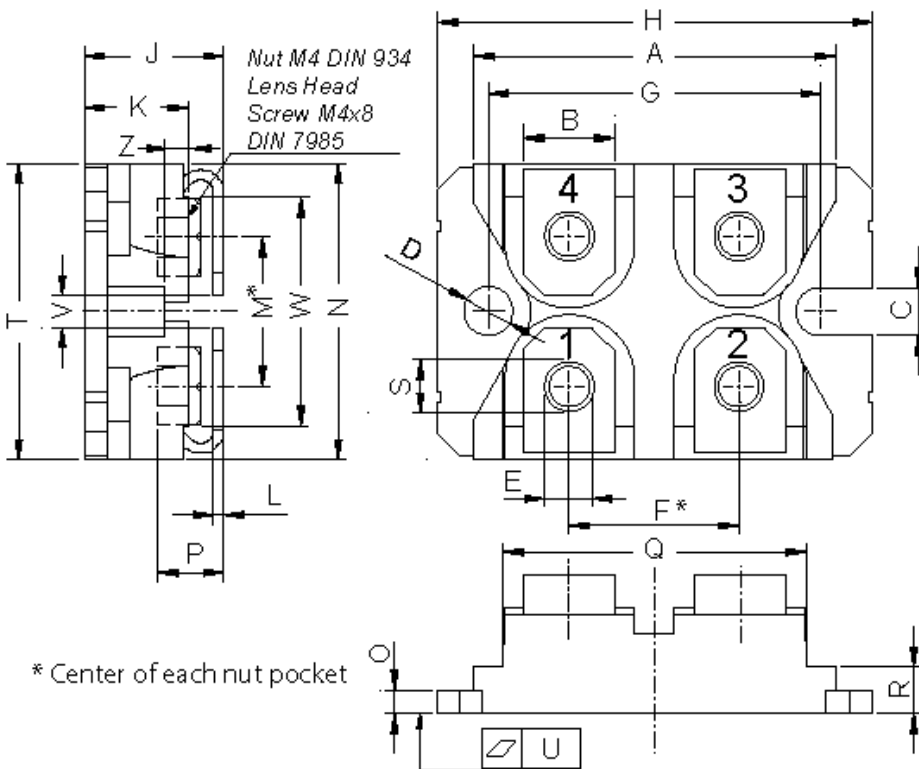
$T_{VJ} = 150^{\circ}C$



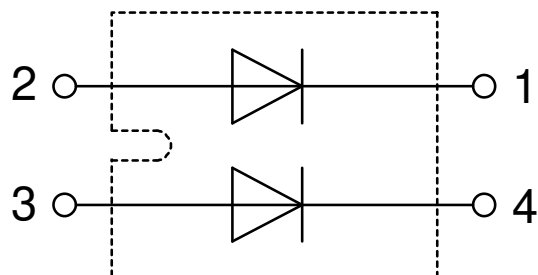
Symbol	Definition	Value	Unit
$V_{0\ max}$	threshold voltage	0.81	V
$R_{0\ max}$	slope resistance *	1.4	mΩ



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



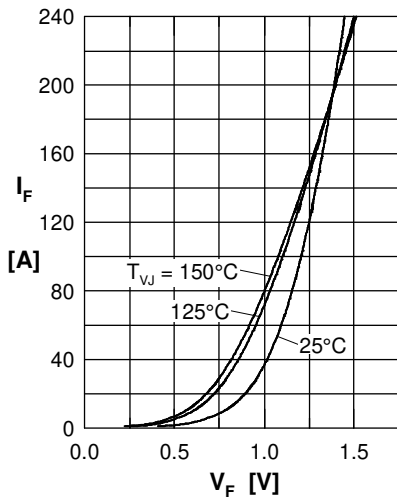
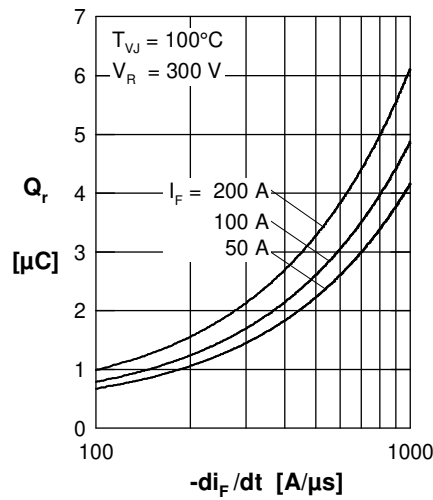
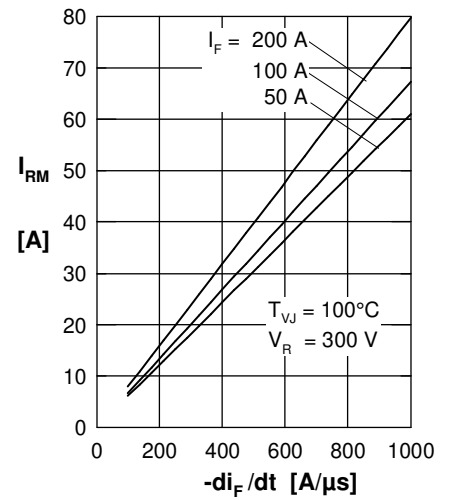
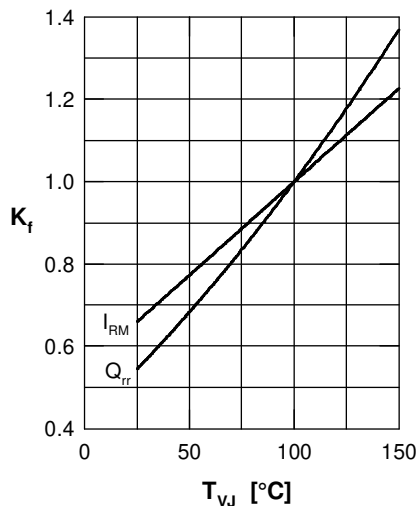
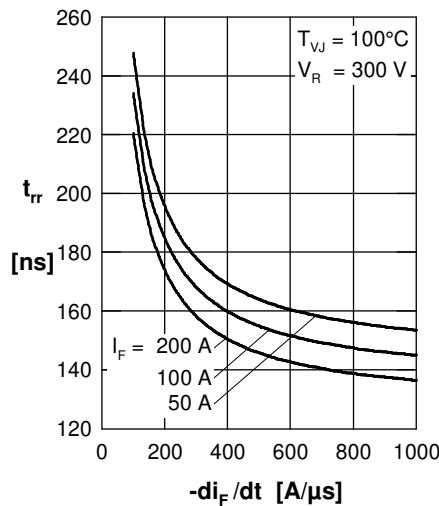
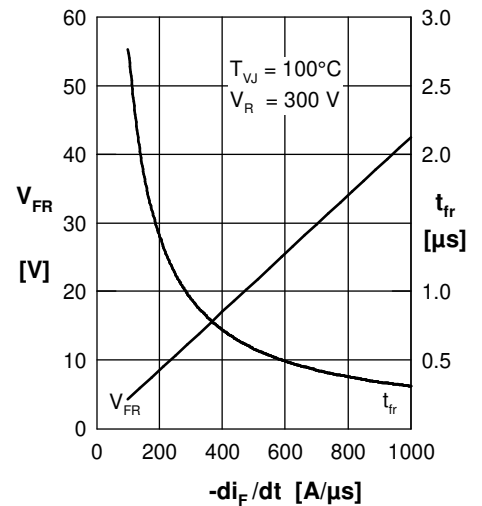
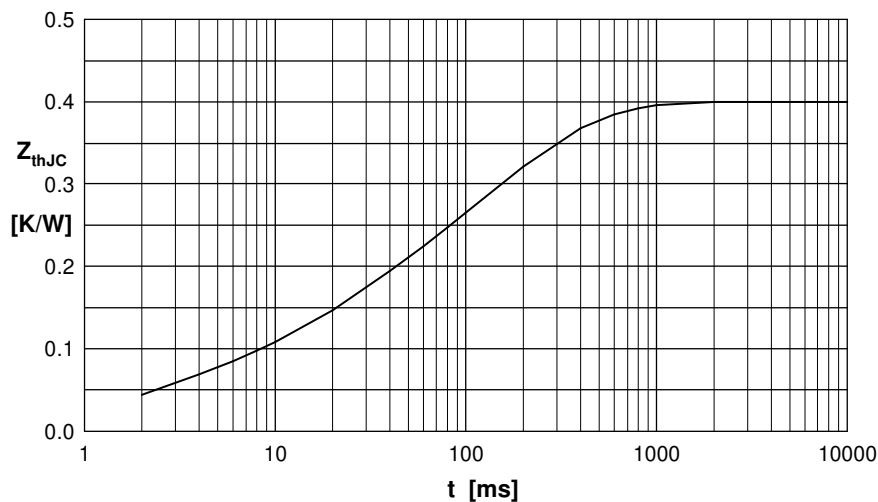
Fast Diode

 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. dyn. 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_{tr} versus di_F/dt


Fig. 7 Transient thermal impedance junction to case

 Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.040	0.010
2	0.045	0.002
3	0.070	0.026
4	0.110	0.300
5	0.135	0.110

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