

# HiPerFET™

## Power MOSFETs

IXFN44N50U2

IXFN44N50U3

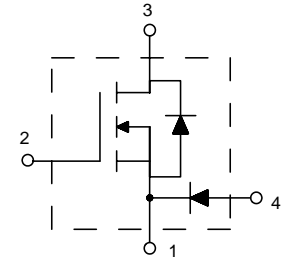
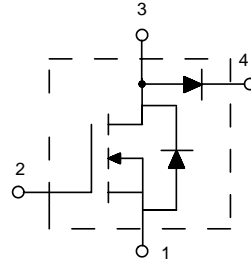
$V_{DSS}$	$I_D$ (cont)	$R_{DS(on)}$	$t_{rr}$
500 V	44 A	0.12 $\Omega$	35 ns
500 V	48 A	0.10 $\Omega$	35 ns

IXFN48N50U2

IXFN48N50U3

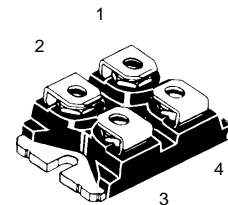
### Buck & Boost Configurations for PFC & Motor Control Circuits

Preliminary data



Symbol	Test Conditions	Maximum Ratings			
HiPerFET MOSFET	$V_{DSS}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	500	V	
	$V_{DGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1\text{ M}\Omega$	500	V	
	$V_{GS}$	Continuous	$\pm 20$	V	
	$V_{GSM}$	Transient	$\pm 30$	V	
	$I_{D25}$	$T_C = 25^\circ\text{C}$	44N50	44	A
			48N50	48	A
	$I_{DM}$	$T_C = 25^\circ\text{C}$ , pulse width limited by max. $T_{JM}$	44N50	176	A
			48N50	192	A
	$I_{AR}$	$T_C = 25^\circ\text{C}$	24	A	
	$E_{AR}$	Repetitive	30	mJ	
$dv/dt$	$I_S \leq I_{DM}$ , $-di/dt \leq 100\text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ , $R_G = 2\ \Omega$	5	V/ns		
$P_D$	$T_C = 25^\circ\text{C}$	520	W		
DIODE	$V_{RRM}$		600	V	
	$I_{FAVM}$	$T_C = 70^\circ\text{C}$ ; rectangular, $d = 0.5$	60	A	
	$I_{FRM}$	$tp < 10\ \mu\text{s}$ ; pulse width limited by $T_J$	800	A	
	$P_D$	$T_C = 25^\circ\text{C}$	180	W	
CASE	$T_J$		-40 ... +150	$^\circ\text{C}$	
	$T_{JM}$		150	$^\circ\text{C}$	
	$T_{stg}$		-40 ... +150	$^\circ\text{C}$	
	$V_{ISOL}$	50/60 Hz, RMS	$t = 1\text{ min}$	2500	V~
		$I_{ISOL} \leq 1\text{ mA}$	$t = 1\text{ s}$	3000	V~
$M_d$	Mounting torque		1.5/13	Nm/lb.in.	
	Terminal connection torque (M4)		1.5/13	Nm/lb.in.	
<b>Weight</b>			30	g	

### miniBLOC, SOT-227 B



#### Features

- Popular Buck & Boost circuit topologies
- International standard package miniBLOC SOT-227B
- Aluminium nitride isolation - high power dissipation
- Isolation voltage 3000 V~
- Low  $R_{DS(on)}$  HDMOS™ process
- Rugged polysilicon gate cell structure
- Low drain-to-case capacitance (<60 pF) - reduced RFI
- Ultra-fast FRED diode with soft reverse recovery

#### Applications

- Power factor controls and buck regulators
- DC servo and robotic drives
- DC choppers
- Switch reluctance motor controls

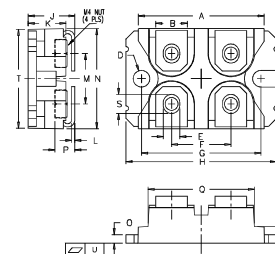
#### Advantages

- Easy to mount with 2 screws
- Space savings
- Tightly coupled FRED

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{DSS}$	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 8\text{ mA}$	2		V
$I_{GSS}$	$V_{GS} = \pm 20\text{ V}_{DC}, V_{DS} = 0$			$\pm 200$ nA
$I_{DSS}$	$V_{DS} = 0.8\text{ V}_{DSS}, V_{GS} = 0\text{ V}$		$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$	400 $\mu\text{A}$ 2 mA
$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 0.5\text{ I}_{D25}$		44N50 48N50	0.12 $\Omega$ 0.10 $\Omega$
Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $\delta \leq 2\%$				

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$g_{fs}$	$V_{DS} = 10\text{ V}, I_D = 0.5\text{ I}_{D25}$ , pulse test	22	42	S
$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		8400	pF
$C_{oss}$			900	pF
$C_{rss}$			280	pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5\text{ V}_{DSS}, I_D = 0.5\text{ I}_{D25}$ $R_G = 1\text{ }\Omega$ (External)		30	ns
$t_r$			60	ns
$t_{d(off)}$			100	ns
$t_f$			30	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5\text{ V}_{DSS}, I_D = 0.5\text{ I}_{D25}$		270	nC
$Q_{gs}$			60	nC
$Q_{gd}$			135	nC
$R_{thJC}$		0.24		K/W
$R_{thCK}$		0.05		K/W

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$I_R$	$T_J = 25^\circ\text{C}; V_R = V_{RRM}$ $V_R = 0.8V_{RRM}$			200 $\mu\text{A}$
				100 $\mu\text{A}$
	$T_J = 125^\circ\text{C}; V_R = 0.8V_{RRM}$			14 mA
$V_F$	$I_F = 70\text{ A}, V_{GS} = 0\text{ V}, T_J = 150^\circ\text{C}$			1.5 V
	Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $\delta \leq 2\%$ $T_J = 25^\circ\text{C}$			1.8 V
$t_{rr}$	$I_F = 1\text{ A}, di/dt = -200\text{ A}/\mu\text{s}, V_R = 30\text{ V}, T_J = 25^\circ\text{C}$		35	50 ns
$I_{RM}$	$I_F = 60\text{ A}, di/dt = -480\text{ A}/\mu\text{s}, V_R = 350\text{ V}, T_J = 100^\circ\text{C}$		19	21 A
$R_{thJC}$				0.7 K/W
$R_{thJK}$			0.05	K/W

**miniBLOC, SOT-227 B**


M4 screws (4x) supplied

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	38.00	38.23	1.496	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.76	0.84	0.030	0.033
M	12.60	12.85	0.496	0.506
N	25.15	25.42	0.990	1.001
O	1.98	2.13	0.078	0.084
P	4.95	5.97	0.195	0.235
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.174
S	4.72	4.85	0.186	0.191
T	24.59	25.07	0.968	0.987
U	-0.05	0.1	-0.002	0.004

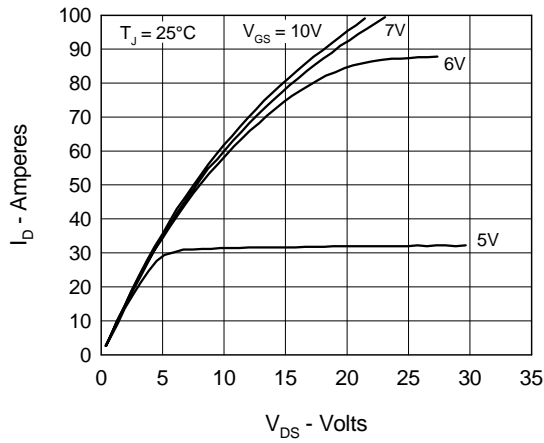
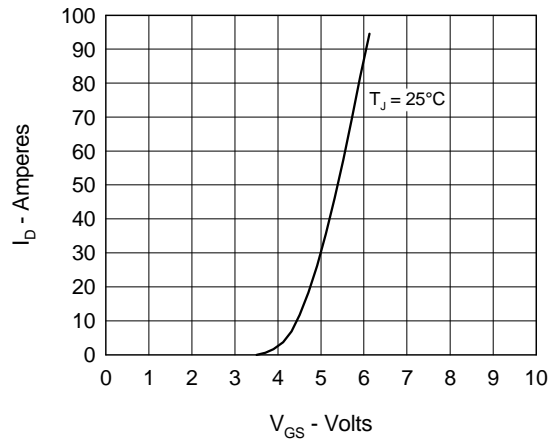
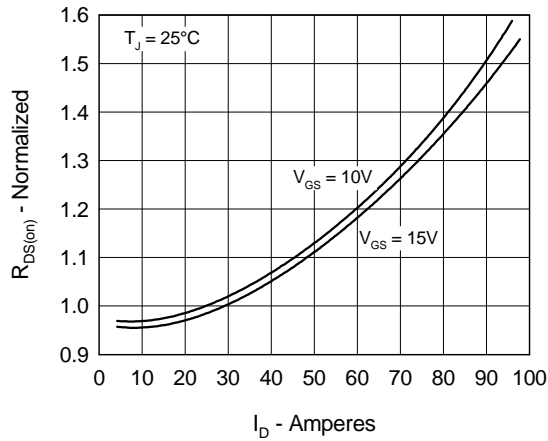
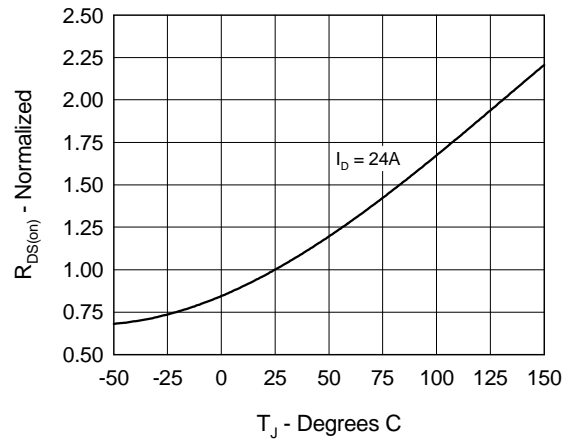
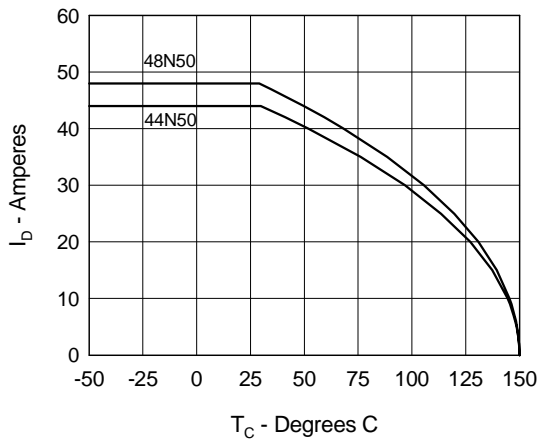
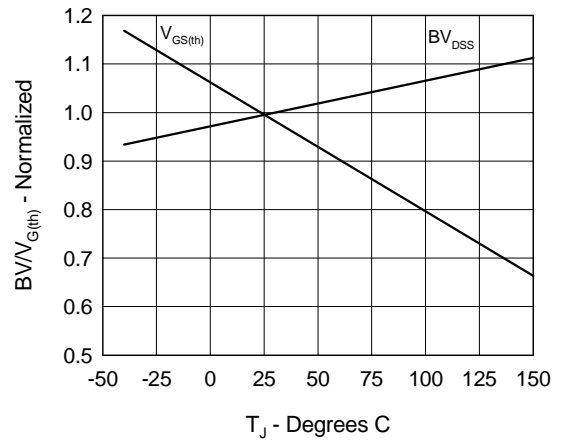
**Fig.1 Output Characteristics**

**Fig.2 Input Admittance**

**Fig.3  $R_{DS(on)}$  vs. Drain Current**

**Fig.4 Temperature Dependence of Drain to Source Resistance**

**Fig.5 Drain Current vs. Case Temperature**

**Fig.6 Temperature Dependence of Breakdown and Threshold Voltage**


Fig.7 Gate Charge Characteristic Curve

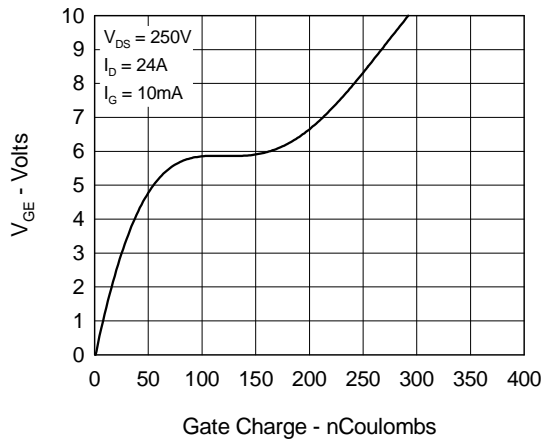


Fig.8 Capacitance Curves

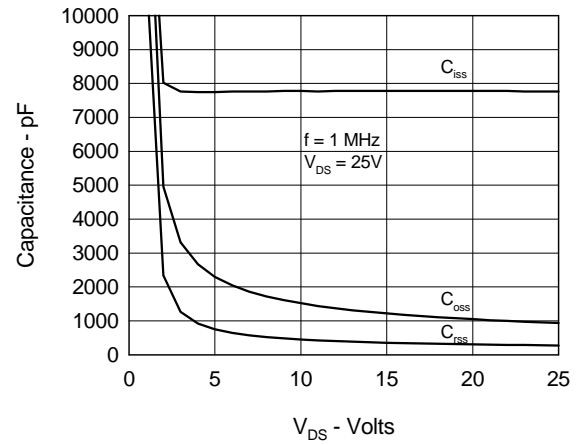


Fig.9 Source Current vs. Source to Drain Voltage

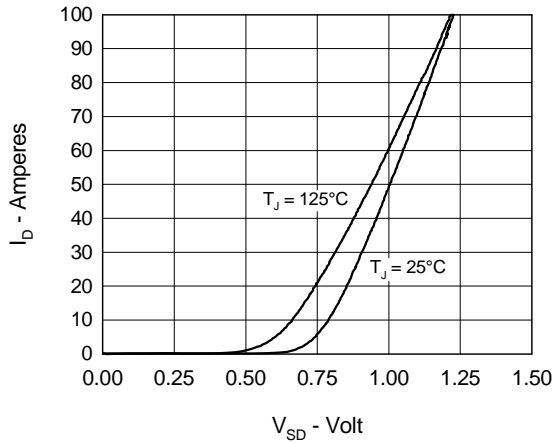
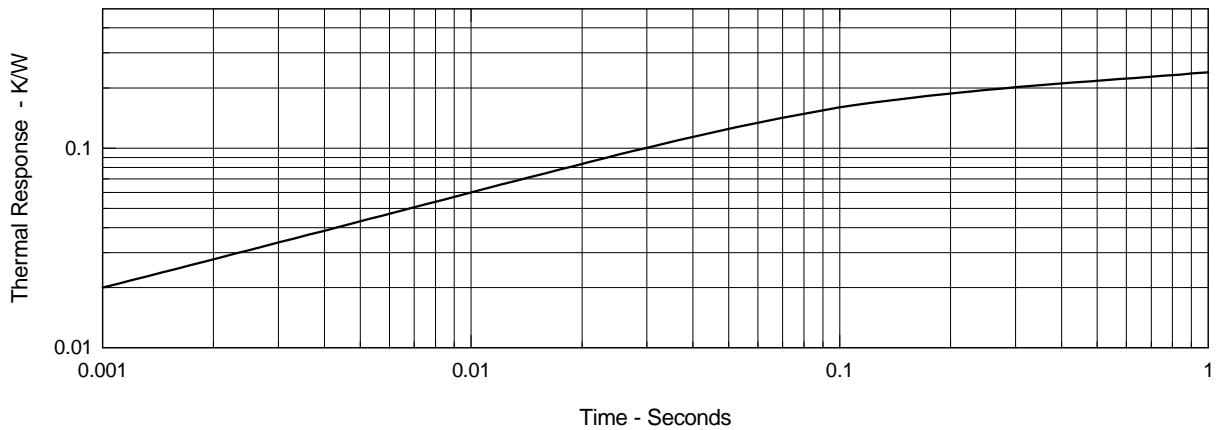


Fig.10 Transient Thermal Impedance



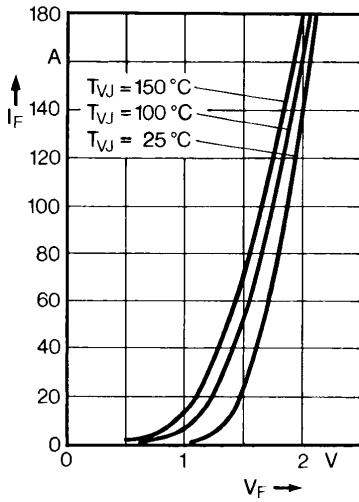


Fig. 11. Forward voltage drop.

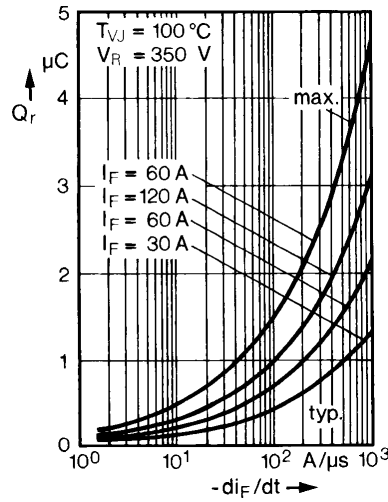


Fig. 12. Recovery charge versus  $-di_F/dt$ .

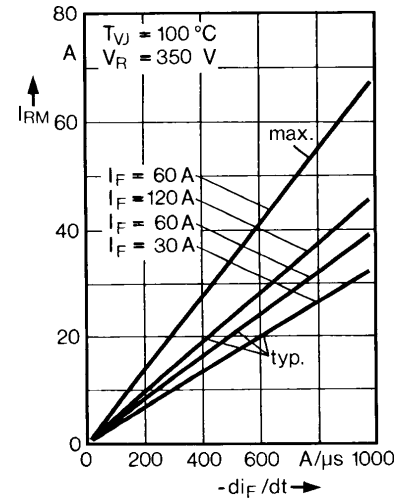


Fig. 13. Peak reverse current vs.  $-di_F/dt$ .

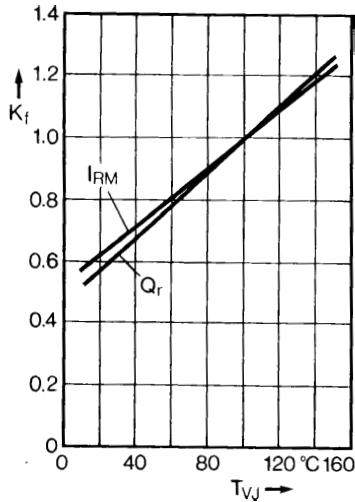


Fig. 14. Dynamic parameters versus junction temperature.

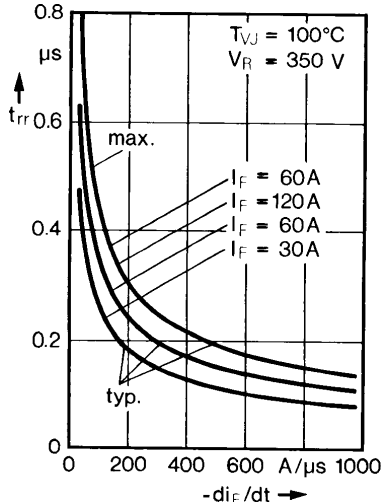


Fig. 15. Recovery time versus  $-di_F/dt$ .

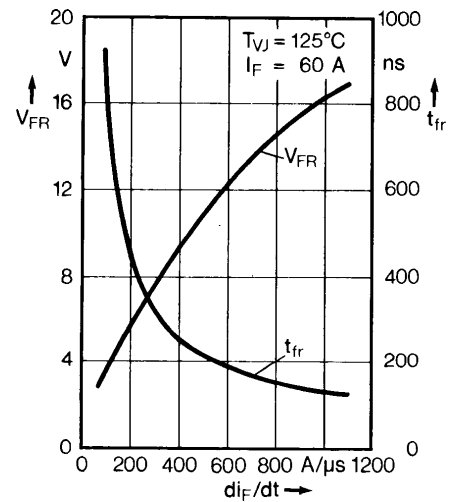


Fig. 16. Peak forward voltage and forward recovery time vs.  $di_F/dt$ .

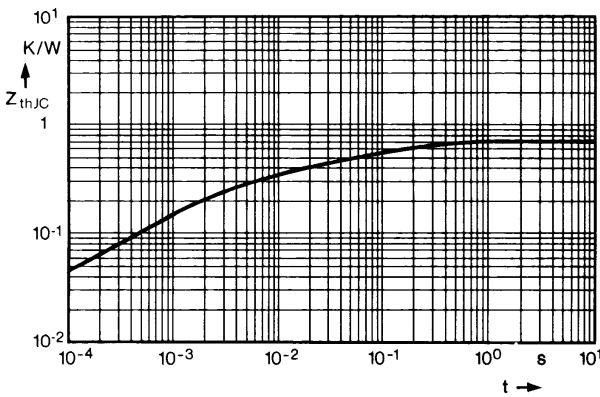


Fig. 17. Transient thermal impedance junction to case.