

# HiPerFET™ Power MOSFETs Single MOSFET Die

N-Channel Enhancement Mode  
Avalanche Rated, High dv/dt, Low  $t_{rr}$

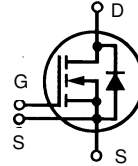
## IXFN 39N90

$$V_{DSS} = 900 \text{ V}$$

$$I_{D25} = 39 \text{ A}$$

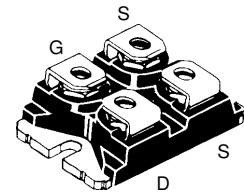
$$R_{DS(on)} = 0.22 \text{ } \Omega$$

$$t_{rr} \leq 250 \text{ ns}$$



Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	900	V
$V_{DGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$	900	V
$V_{GS}$	Continuous	$\pm 20$	V
$V_{GSM}$	Transient	$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	39	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$	154	A
$I_{AR}$	$T_C = 25^\circ\text{C}$	39	A
$E_{AR}$	$T_C = 25^\circ\text{C}$	64	mJ
$E_{AS}$	$T_C = 25^\circ\text{C}$	4	J
dv/dt	$I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ , $R_G = 2 \text{ } \Omega$	5	V/ns
$P_D$	$T_C = 25^\circ\text{C}$	700	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
$V_{ISOL}$	50/60 Hz, RMS $t = 1 \text{ min}$ $I_{ISOL} \leq 1 \text{ mA}$ $t = 1 \text{ s}$	2500 3000	V~ V~
$M_d$	Mounting torque Terminal connection torque	1.5/13 1.5/13	Nm/lb.in. Nm/lb.in.
Weight		30	g

miniBLOC, SOT-227 B (IXFN)  
E153432



G = Gate  
S = Source  
D = Drain  
TAB = Drain

Either Source terminal at miniBLOC can be used as Main or Kelvin Source

### Features

- International standard packages
- miniBLOC, with Aluminium nitride isolation
- Low  $R_{DS(on)}$  HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
- Fast intrinsic Rectifier

### Applications

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- Temperature and lighting controls

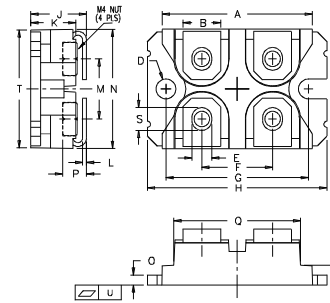
### Advantages

- Easy to mount
- Space savings
- High power density

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{DSS}$ $BV_{DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 3 \text{ mA}$ Temperature dependence	900	3.68	V V/K
$V_{GH(th)}$ $V_{GH(th)}$	$V_{DS} = V_{GS}$ , $I_D = 8 \text{ mA}$ Temperature dependence	2.5	-0.009	5.0 V V/K
$I_{GSS}$	$V_{GS} = \pm 20 V_{DC}$ , $V_{DS} = 0$			$\pm 200 \text{ nA}$
$I_{DSS}$	$V_{DS} = V_{DSS}$ , $T_J = 25^\circ\text{C}$ $V_{GS} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$			100 $\mu\text{A}$ 2 mA
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$ Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$			0.22 $\Omega$

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$g_{fs}$	$V_{DS} = 15\text{ V}; I_D = 0.5 \cdot I_{D25}$ , pulse test	30	45	S
$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		9200	pF
$C_{oss}$			1360	pF
$C_{rss}$			380	pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 1\ \Omega$ (External),		45	ns
$t_r$			68	ns
$t_{d(off)}$			125	ns
$t_f$			30	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$		390	nC
$Q_{gs}$			65	nC
$Q_{gd}$			190	nC
$R_{thJC}$			0.18	K/W
$R_{thCK}$		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

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$I_S$	$V_{GS} = 0\text{ V}$			39 A
$I_{SM}$	Repetitive; pulse width limited by $T_{JM}$			154 A
$V_{SD}$	$I_F = I_S, V_{GS} = 0\text{ V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$			1.3 V
$t_{TR}$	$I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$		2.0	250 ns
$Q_{RM}$			9.0	$\mu\text{C}$
$I_{RM}$				A

IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETS and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715  
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025

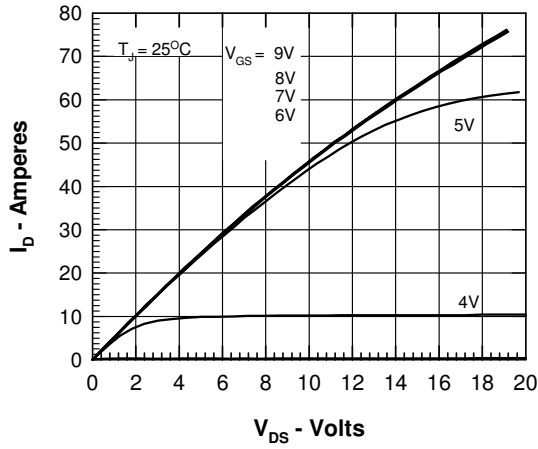
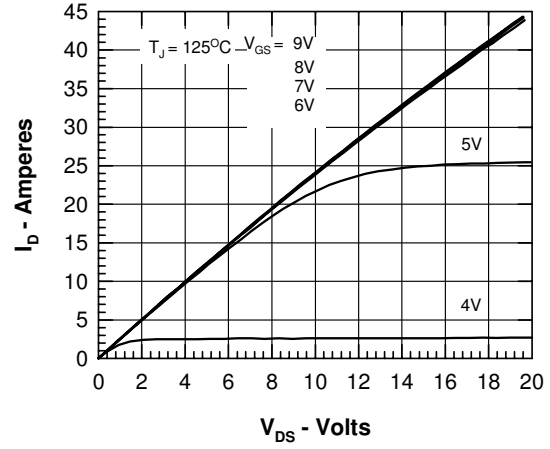
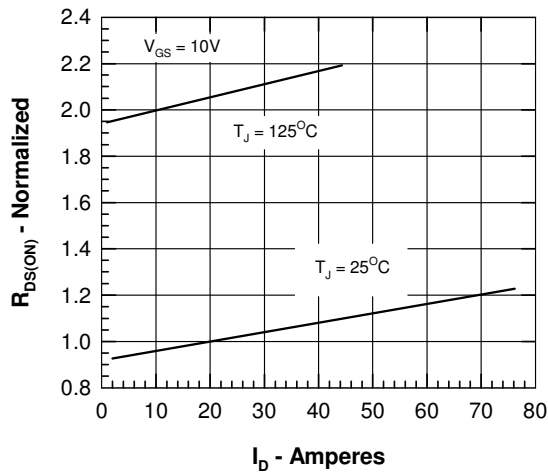
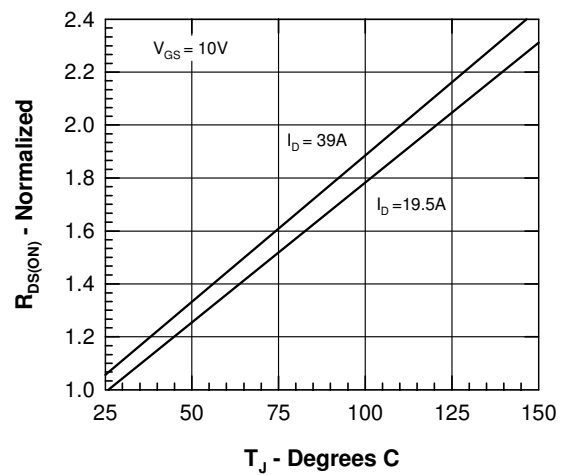
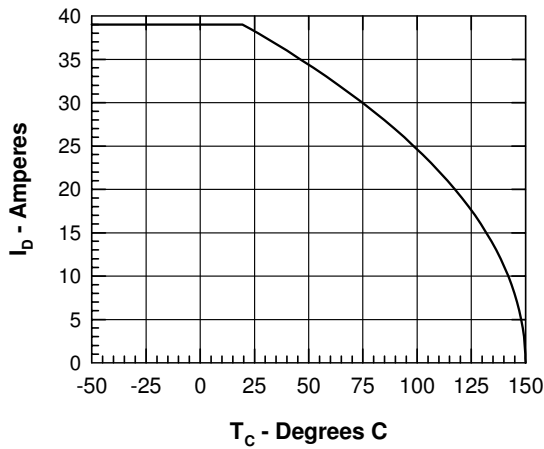
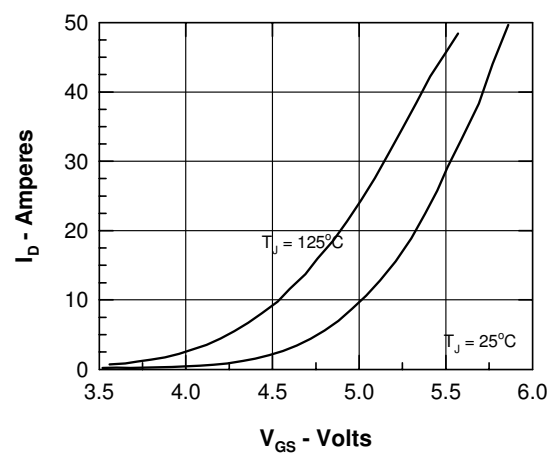
**Figure 1. Output Characteristics at 25°C**

**Figure 2. Output Characteristics at 125°C**

**Figure 3.  $R_{DS(on)}$  normalized to 0.5  $I_{D25}$  value vs.  $I_D$** 

**Figure 4.  $R_{DS(on)}$  normalized to 0.5  $I_{D25}$  value vs.  $T_J$** 

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

**Figure 6. Admittance Curves**


Figure 7. Gate Charge

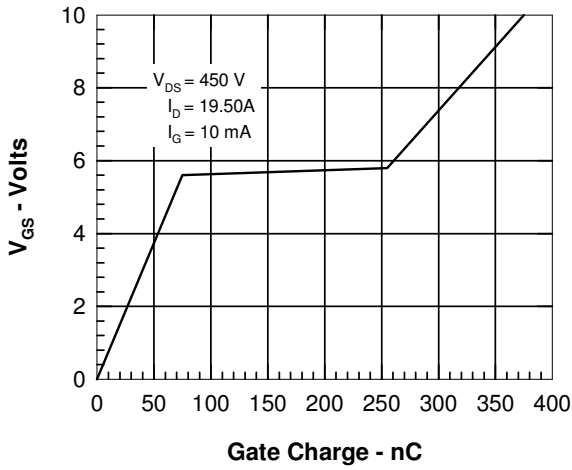


Figure 8. Capacitance Curves

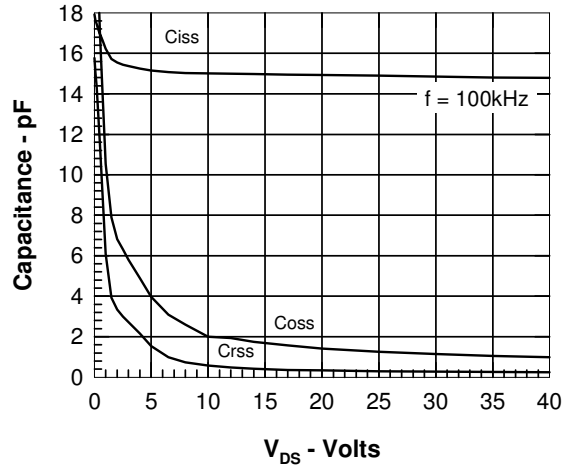


Figure 9. Forward Voltage Drop of the Intrinsic Diode

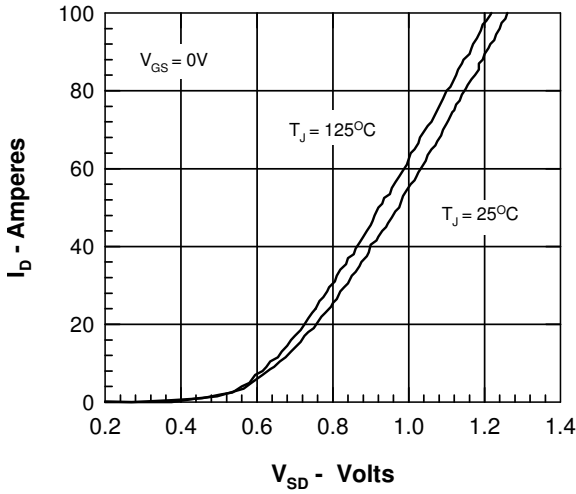
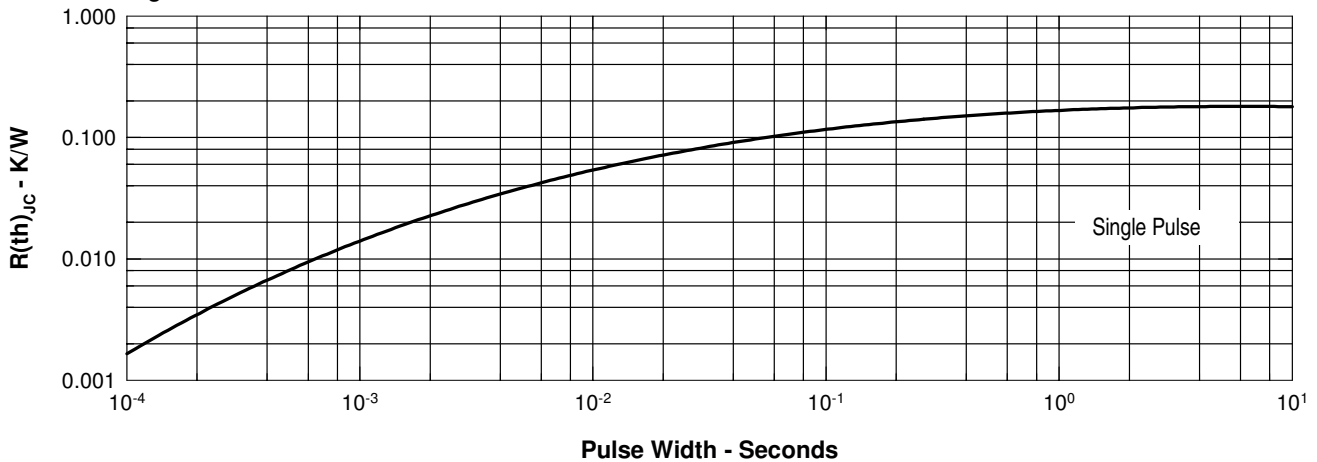


Figure 10. Transient Thermal Resistance



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