



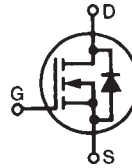
**THE DATASHEET OF  
IXFN48N60P**



# PolarHV™ HiPerFET IXFN 48N60P

## Power MOSFET

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



$$V_{DSS} = 600 \text{ V}$$

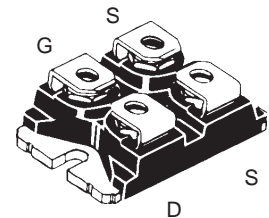
$$I_{D25} = 40 \text{ A}$$

$$R_{DS(on)} \leq 140 \text{ m}\Omega$$

$$t_{rr} \leq 200 \text{ ns}$$

Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	600	V
$V_{DGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$	600	V
$V_{GSS}$	Continuous	$\pm 30$	V
$V_{GSM}$	Transient	$\pm 40$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	40	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$	110	A
$I_{AR}$	$T_C = 25^\circ\text{C}$	48	A
$E_{AR}$	$T_C = 25^\circ\text{C}$	70	mJ
$E_{AS}$	$T_C = 25^\circ\text{C}$	2.0	J
$dv/dt$	$I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$	10	V/ns
$P_D$	$T_C = 25^\circ\text{C}$	625	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
$T_L$	1.6 mm (0.062 in.) from case for 10 s	300	$^\circ\text{C}$
$V_{ISOL}$	50/60 Hz, RMS $I_{ISOL} \leq 1 \text{ mA}$	$t = 1 \text{ min}$ 2500 $t = 1 \text{ s}$ 3000	V~ V~
$M_d$	Mounting torque Terminal connection torque	1.5 / 13 1.5 / 13	Nm/lb.in. Nm/lb.in.
<b>Weight</b>		30	g

miniBLOC, SOT-227 B (IXFN)  
E153432



G = Gate  
S = Source  
D = Drain

Either Source terminal S can be used as the Source terminal or the Kelvin Source (gate return) terminal.

### Features

- International standard package
- Encapsulating epoxy meets UL 94 V-0, flammability classification
- miniBLOC with Aluminium nitride isolation
- Fast recovery diode
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
  - easy to drive and to protect

### Advantages

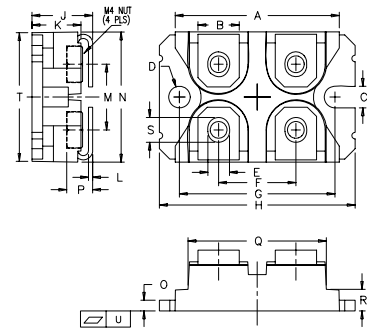
- Easy to mount
- Space savings
- High power density

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$	600		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 8 \text{ mA}$	3.0		5.5 V
$I_{GSS}$	$V_{GS} = \pm 30 \text{ V}_{DC}$ , $V_{DS} = 0$			$\pm 200 \text{ nA}$
$I_{DSS}$	$V_{DS} = V_{DSS}$ $V_{GS} = 0 \text{ V}$ $T_J = 125^\circ\text{C}$			25 $\mu\text{A}$ 1000 $\mu\text{A}$
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = 4 \text{ A}$ Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$			140 $\text{m}\Omega$

Symbol	Test Conditions	Characteristic Values		
		(T <sub>J</sub> = 25°C, unless otherwise specified)		
		Min.	Typ.	Max.
$g_{fs}$	V <sub>DS</sub> = 20 V; I <sub>D</sub> = 24 A, pulse test	35	53	S
C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		8860	pF
C <sub>oss</sub>			850	pF
C <sub>rss</sub>			60	pF
t <sub>d(on)</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 24 A R <sub>G</sub> = 2 Ω (External)		30	ns
t <sub>r</sub>			25	ns
t <sub>d(off)</sub>			85	ns
t <sub>f</sub>			22	ns
Q <sub>g(on)</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 24 A		150	nC
Q <sub>gs</sub>			50	nC
Q <sub>gd</sub>			50	nC
R <sub>thJC</sub>	SOT-227B			0.2 °C/W
R <sub>thCS</sub>			0.05	°C/W

Symbol	Test Conditions	Characteristic Values		
		(T <sub>J</sub> = 25°C, unless otherwise specified)		
		Min.	Typ.	Max.
I <sub>S</sub>	V <sub>GS</sub> = 0 V			48 A
I <sub>SM</sub>	Repetitive			110 A
V <sub>SD</sub>	I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0 V, Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %			1.5 V
t <sub>rr</sub>	I <sub>F</sub> = 25A, -di/dt = 100 A/μs V <sub>R</sub> = 100V			200 ns
Q <sub>RM</sub>			0.8	μC
I <sub>RM</sub>			6.0	A

### SOT-227B (IXFN) Outline

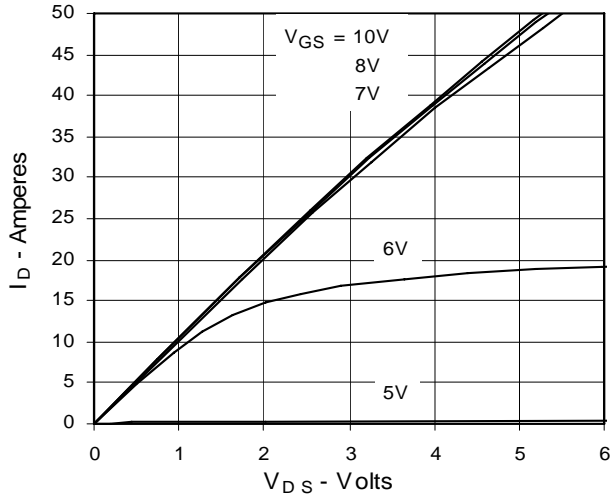


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.240	1.255	31.50	31.88
B	.307	.323	7.80	8.20
C	.161	.169	4.09	4.29
D	.161	.169	4.09	4.29
E	.161	.169	4.09	4.29
F	.587	.595	14.91	15.11
G	1.186	1.193	30.12	30.30
H	1.496	1.505	38.00	38.23
J	.460	.481	11.68	12.22
K	.351	.378	8.92	9.60
L	.030	.033	0.76	0.84
M	.496	.506	12.60	12.85
N	.990	1.001	25.15	25.42
O	.078	.084	1.98	2.13
P	.195	.235	4.95	5.97
Q	1.045	1.059	26.54	26.90
R	.155	.174	3.94	4.42
S	.186	.191	4.72	4.85
T	.968	.987	24.59	25.07
U	-.002	.004	-0.05	0.1

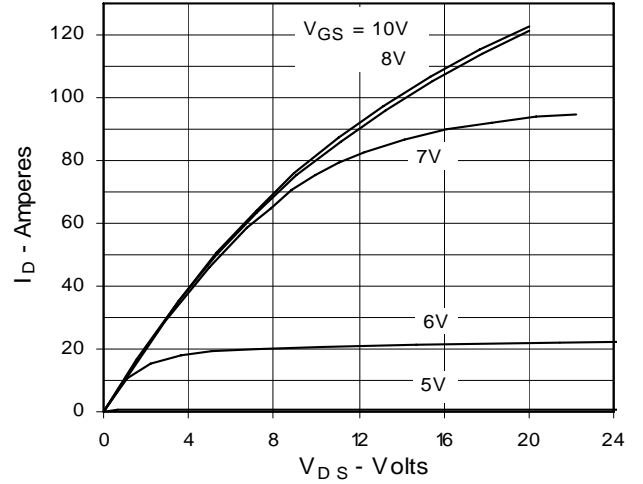
IXYS reserves the right to change limits, test conditions, and dimensions.

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 4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6,771,478 B2

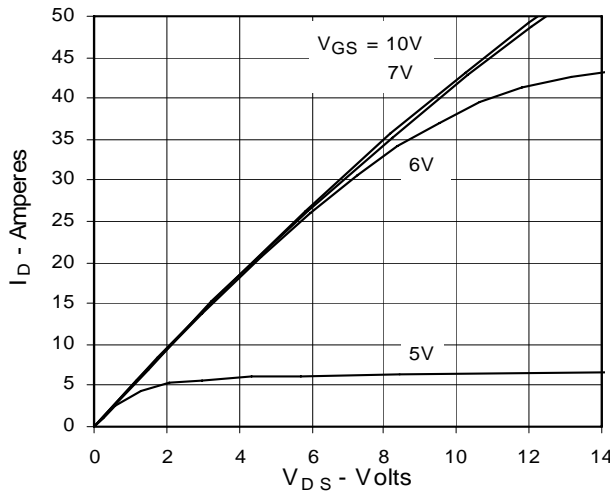
**Fig. 1. Output Characteristics @ 25°C**



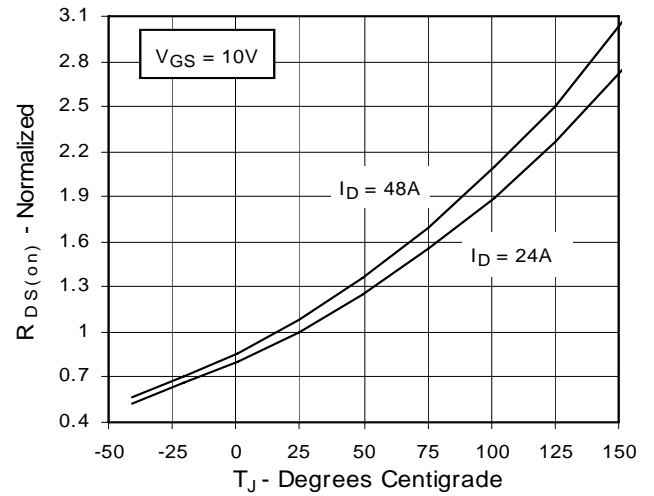
**Fig. 2. Extended Output Characteristics @ 25°C**



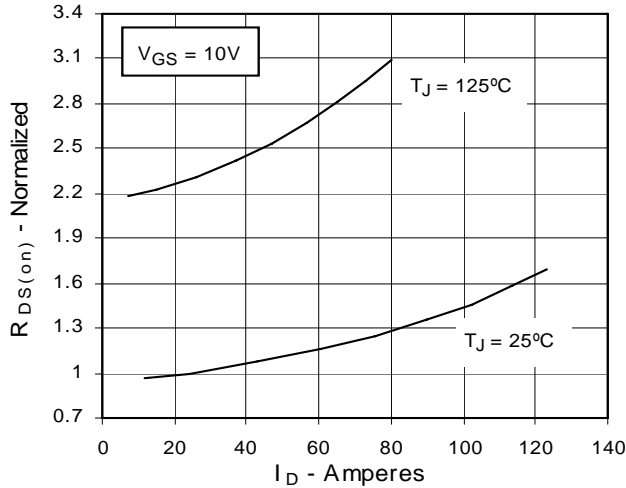
**Fig. 3. Output Characteristics @ 125°C**



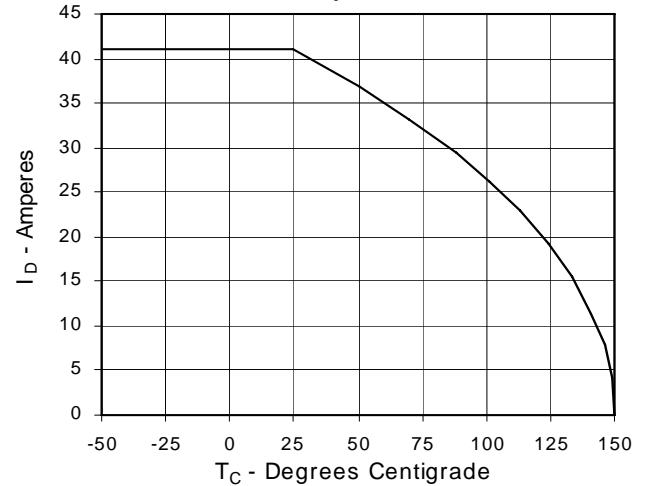
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 24A$  Value vs. Junction Temperature**



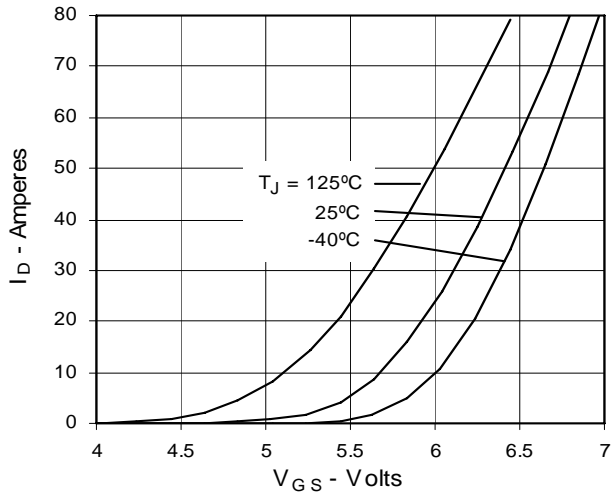
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 24A$  Value vs. Drain Current**



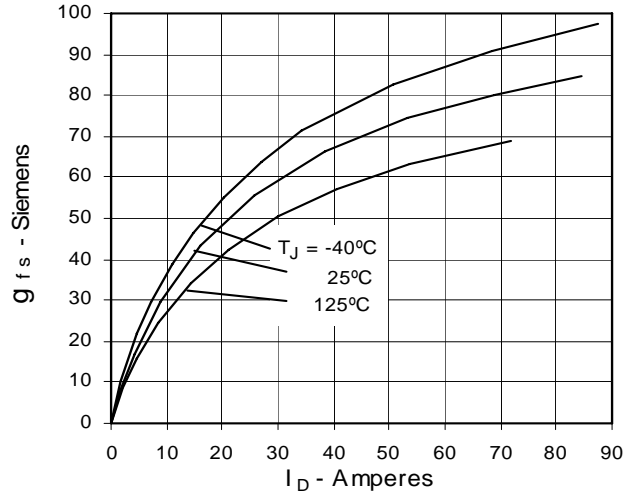
**Fig. 6. Drain Current vs. Case Temperature**



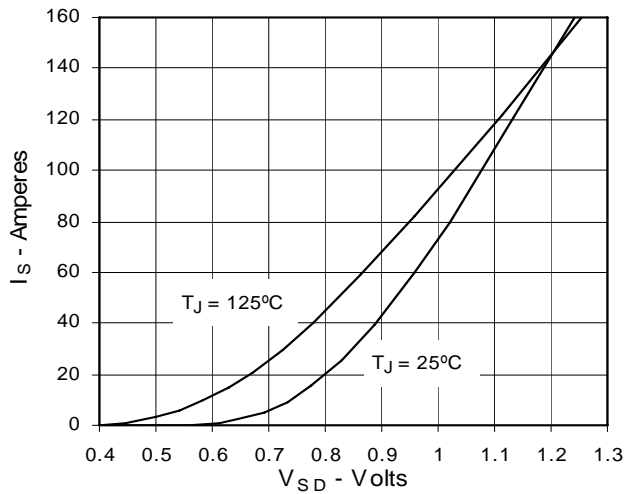
**Fig. 7. Input Admittance**



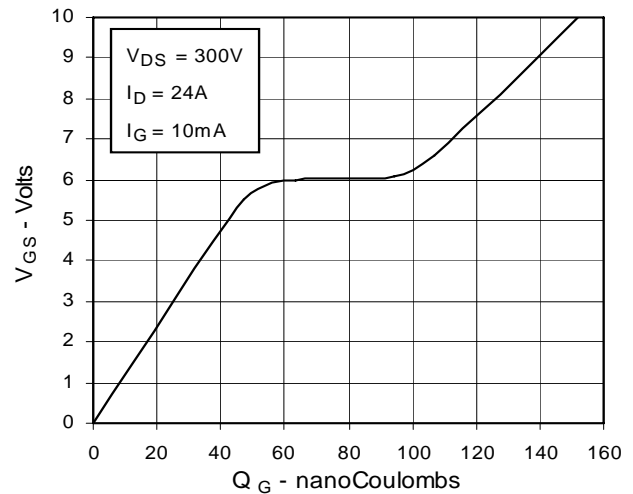
**Fig. 8. Transconductance**



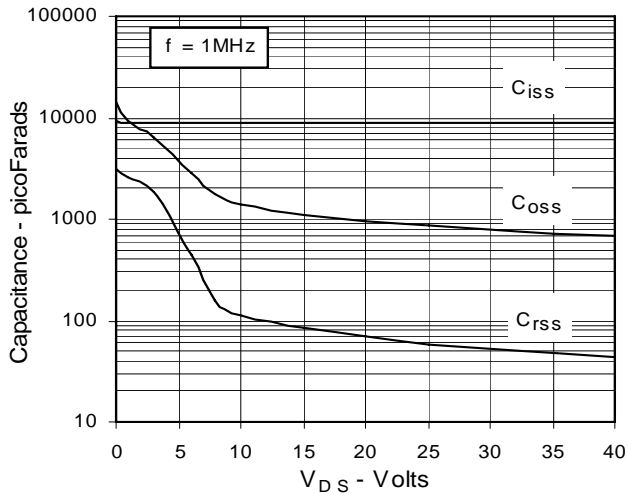
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



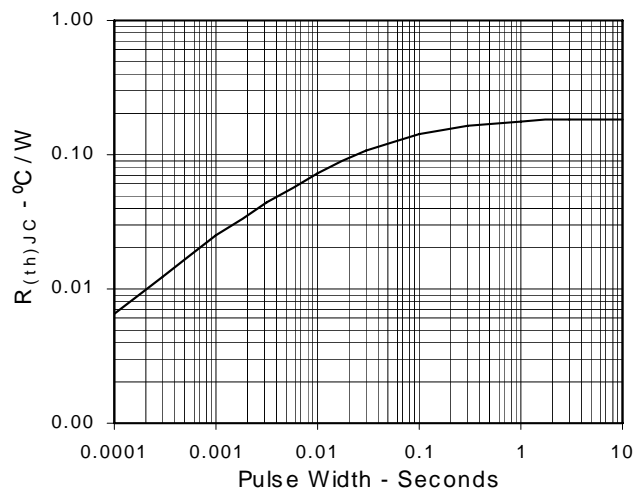
**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 13. Maximum Transient Thermal Resistance**





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