

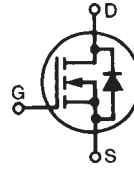
# PolarHT™ HiPerFET IXFC 74N20P

## Power MOSFET

### ISOPLUS220™

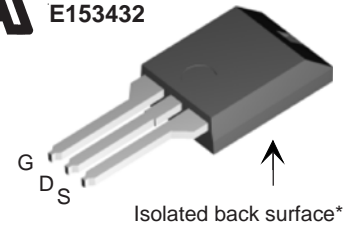
(Electrically Isolated Back Surface)

N-Channel Enhancement Mode  
Fast Recovery Diode, Avalanche  
Rated



$$\begin{aligned} V_{DSS} &= 200 \text{ V} \\ I_{D25} &= 35 \text{ A} \\ R_{DS(on)} &= 36 \text{ m}\Omega \\ t_{rr} &\leq 200 \text{ ns} \end{aligned}$$

ISOPLUS 220™  
E153432



G = Gate      D = Drain  
S = Source

Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$	200	V
$V_{DGR}$	$T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$	200	V
$V_{GS}$	Continuous	$\pm 20$	V
$V_{GSM}$	Transient	$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	35	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$	200	A
$I_{AR}$	$T_C = 25^\circ\text{C}$	60	A
$E_{AR}$	$T_C = 25^\circ\text{C}$	40	mJ
$E_{AS}$	$T_C = 25^\circ\text{C}$	1.0	J
$dv/dt$	$I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ , $R_G = 4 \Omega$	10	V/ns
$P_D$	$T_C = 25^\circ\text{C}$	120	W
$T_J$		-55 ... +175	$^\circ\text{C}$
$T_{JM}$		175	$^\circ\text{C}$
$T_{stg}$		-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, $I_{ISOL} \leq 1 \text{ mA}$ , $t = 1 \text{ minute}$	2500	V~
$F_C$	Mounting Force	11..65 / 2.5..15	N/lb
<b>Weight</b>		3	g

#### Features

- Silicon chip on Direct-Copper-Bond substrate
  - High power dissipation
  - Isolated mounting surface
  - 2500V electrical isolation
- Low drain to tab capacitance (<35pF)
- Low  $R_{DS(on)}$  HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Fast intrinsic Rectifier

#### Applications

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control

#### Advantages

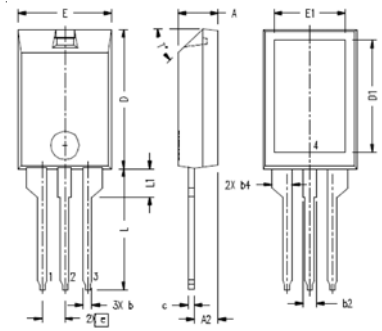
- Easy assembly: no screws, or isolation foils required
- Space savings
- High power density
- Low collector capacitance to ground (low EMI)

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$	200		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 4 \text{ mA}$	2.5		V
$I_{GSS}$	$V_{GS} = \pm 20 V_{DC}$ , $V_{DS} = 0$			$\pm 100 \text{ nA}$
$I_{DSS}$	$V_{DS} = V_{DSS}$ , $V_{GS} = 0 \text{ V}$			25 $\mu\text{A}$ 250 $\mu\text{A}$
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = 37 \text{ A}$ Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$			36 $\text{m}\Omega$

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		Min.	Typ.	Max.
$g_{fs}$	$V_{DS} = 10\text{ V}$ ; $I_D = 37\text{ A}$ , pulse test	30	44	S
$C_{iss}$	$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$		3300	pF
$C_{oss}$			770	pF
$C_{rss}$			190	pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 74\text{ A}$ $R_G = 4\ \Omega$ (External)		23	ns
$t_r$			21	ns
$t_{d(off)}$			60	ns
$t_f$			21	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 37\text{ A}$		107	nC
$Q_{gs}$			24	nC
$Q_{gd}$			52	nC
$R_{thJC}$				1.25 K/W
$R_{thCS}$		0.21		K/W

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		Min.	Typ.	Max.
$I_s$	$V_{GS} = 0\text{ V}$			74 A
$I_{SM}$	Repetitive			180 A
$V_{SD}$	$I_F = I_s$ , $V_{GS} = 0\text{ V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$			1.5 V
$t_{rr}$	$I_F = 25\text{ A}$ , $-di/dt = 100\text{ A}/\mu\text{s}$ $V_R = 100\text{ V}$ , $V_{GS} = 0\text{ V}$			200 ns
$Q_{RM}$			0.4	$\mu\text{C}$
$I_{RM}$			6	A

### ISOPLUS220™ (IXFC) Outline



Note:  
Bottom heatsink (Pin 4) is electrically isolated from Pin 1, 2, or 3.

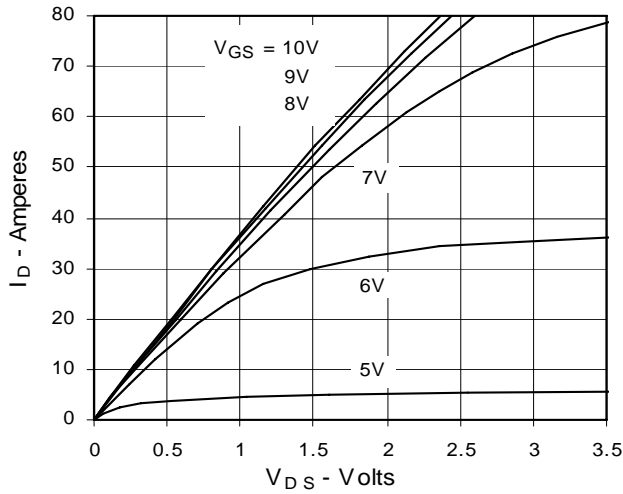
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.157	.197	4.00	5.00
A2	.098	.118	2.50	3.00
b	.035	.051	0.90	1.30
b2	.049	.065	1.25	1.65
b4	.093	.100	2.35	2.55
c	.028	.039	0.70	1.00
D	.591	.630	15.00	16.00
D1	.472	.512	12.00	13.00
E	.394	.433	10.00	11.00
E1	.295	.335	7.50	8.50
e	.100 BASIC		2.55 BASIC	
L	.512	.571	13.00	14.50
L1	.118	.138	3.00	3.50
T*			42.5*	47.5*

Ref: IXYS CO 0177 R0

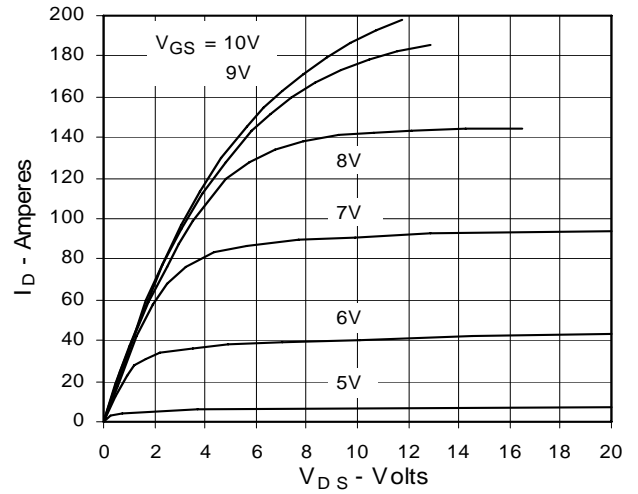
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:	4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585
	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405B2	6,759,692
	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

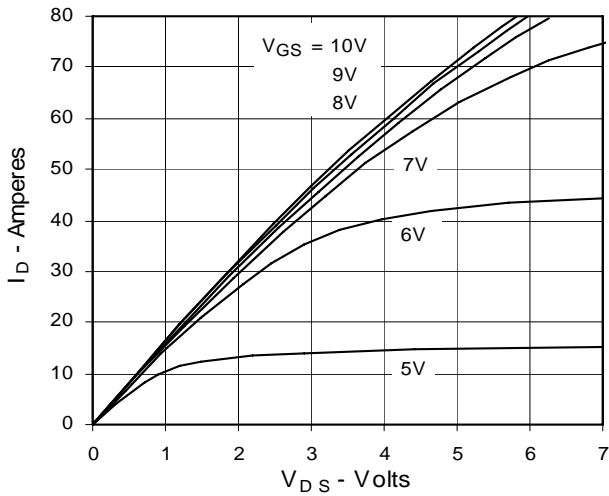
**Fig. 1. Output Characteristics @ 25°C**



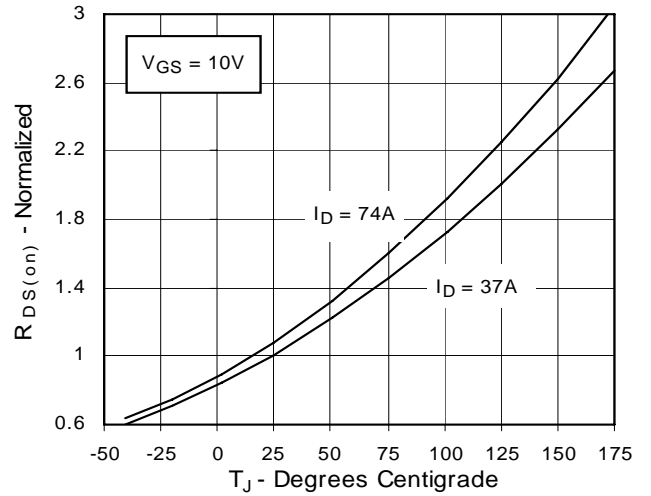
**Fig. 2. Extended Output Characteristics @ 25°C**



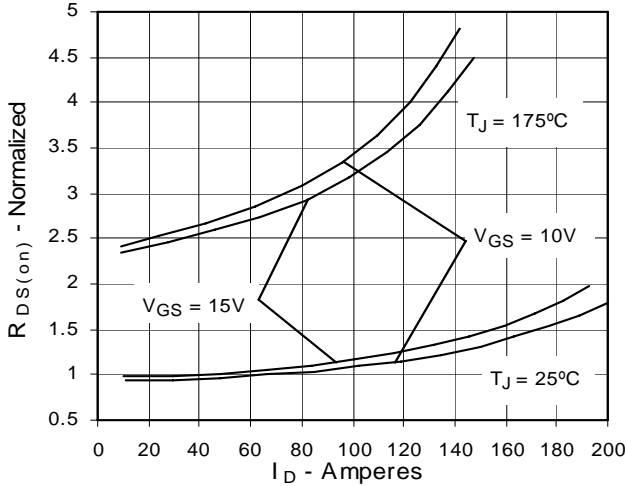
**Fig. 3. Output Characteristics @ 150°C**



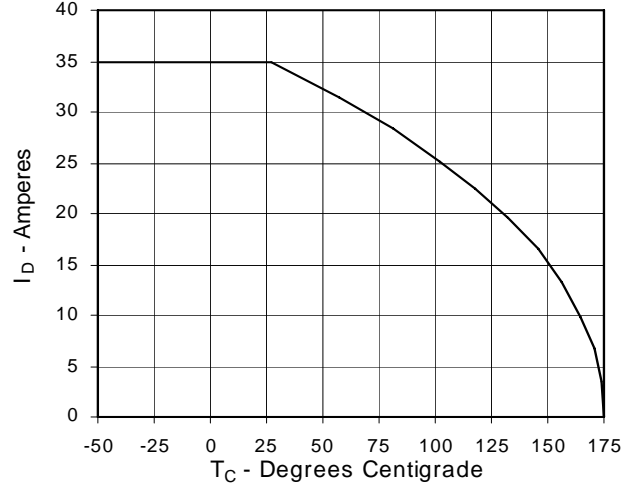
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Junction Temperature**



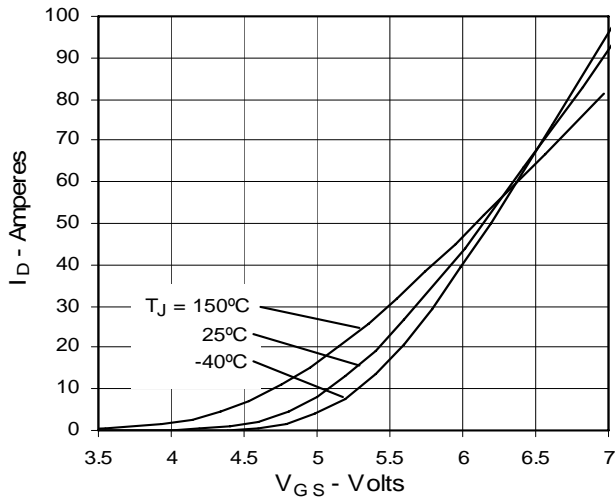
**Fig. 5.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs.  $I_D$**



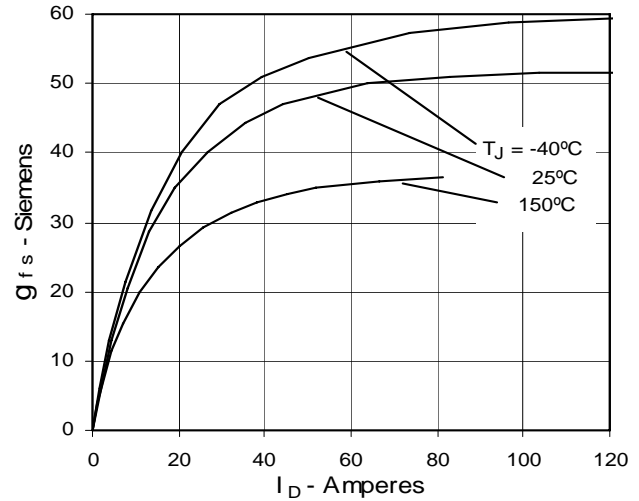
**Fig. 6. Drain Current vs. Case Temperature**



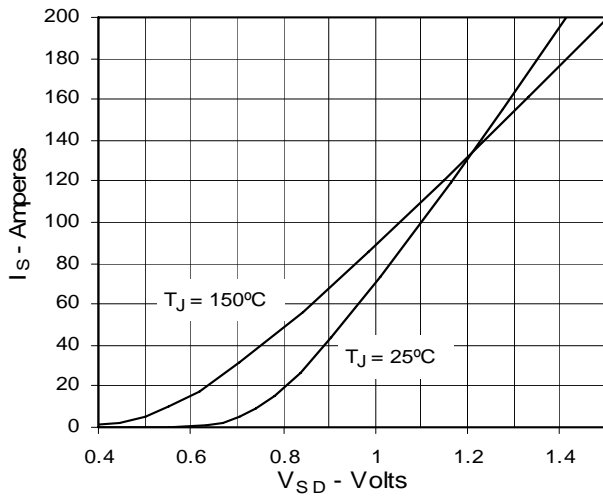
**Fig. 7. Input Admittance**



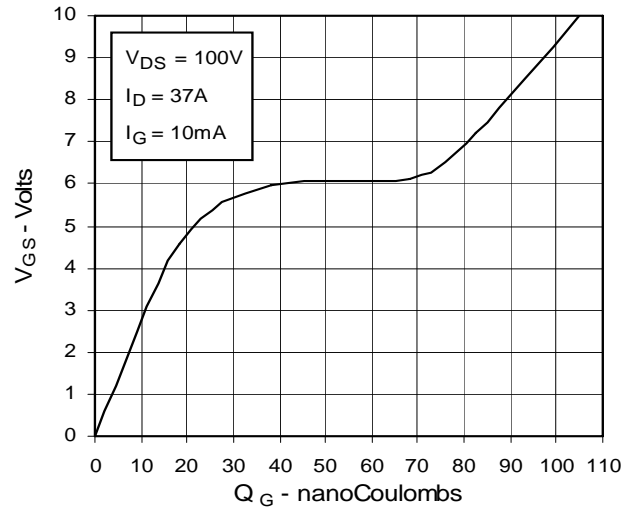
**Fig. 8. Transconductance**



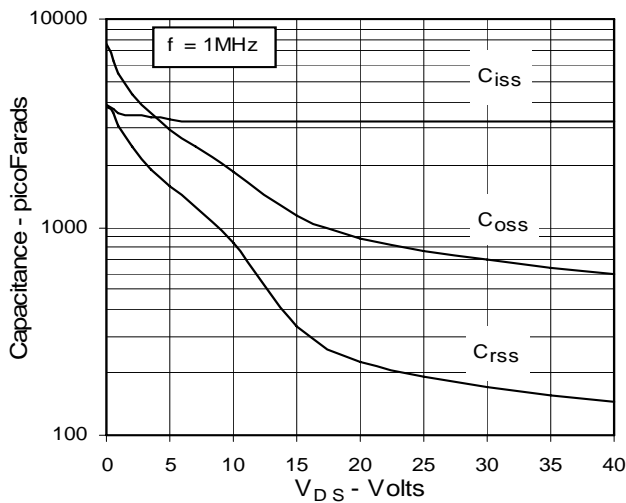
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Forward-Bias Safe Operating Area**

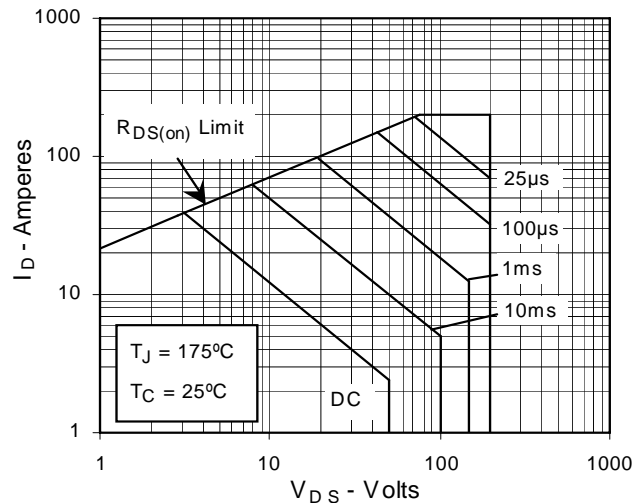


Fig. 13. Maximum Transient Thermal Resistance

