

**Polar™ Power MOSFET**  
**HiperFET™**
**IXFK170N20P**  
**IXFX170N20P**

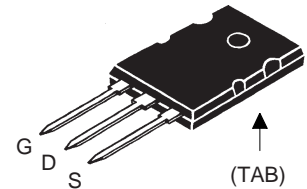
$$V_{DSS} = 200V$$

$$I_{D25} = 170A$$

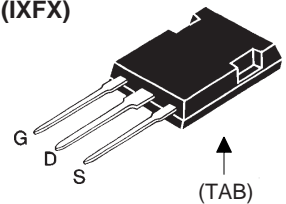
$$R_{DS(on)} \leq 14m\Omega$$

 N-Channel Enhancement Mode  
 Avalanche Rated  
 Fast Intrinsic Diode


TO-264 (IXFK)



PLUS247 (IXFX)


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

Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ C$ to $175^\circ C$	200	V
$V_{DGR}$	$T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$	200	V
$V_{GSS}$	Continuous	$\pm 20$	V
$V_{GSM}$	Transient	$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ C$	170	A
$I_{LRMS}$	Leads Current Limit, RMS	75	A
$I_{DM}$	$T_C = 25^\circ C$ , pulse width limited by $T_{JM}$	400	A
$I_A$	$T_C = 25^\circ C$	85	A
$E_{AS}$	$T_C = 25^\circ C$	4	J
$dV/dt$	$I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 175^\circ C$	20	V/ns
$P_D$	$T_C = 25^\circ C$	1250	W
$T_J$		-55 ... +175	$^\circ C$
$T_{JM}$		175	$^\circ C$
$T_{stg}$		-55 ... +175	$^\circ C$
$T_L$	1.6mm (0.062 in.) from case for 10s	300	$^\circ C$
$T_{SOLD}$	Plastic body for 10s	260	$^\circ C$
$M_d$	Mounting force (PLUS247) Mounting torque (TO-264)	20..120/4.5..27 1.13/10	N/lb. Nm/lb.in.
<b>Weight</b>	PLUS247 TO-264	6 10	g g

**Features**

- Fast intrinsic diode
- Avalanche Rated
- Low  $R_{DS(ON)}$  and  $Q_G$
- Low package inductance

**Advantages**

- Low gate charge results in simple drive requirement
- High power density

**Applications**

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC and DC motor control
- Uninterrupted power supplies
- High speed power switching applications

Symbol	Test Conditions ( $T_J = 25^\circ C$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0V$ , $I_D = 3mA$	200		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 1mA$	3.0		5.0 V
$I_{GSS}$	$V_{GS} = \pm 20V$ , $V_{DS} = 0V$			$\pm 200$ nA
$I_{DSS}$	$V_{DS} = V_{DSS}$ $V_{GS} = 0V$ $T_J = 150^\circ C$			50 $\mu A$ 1 mA
$R_{DS(on)}$	$V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1			14 m $\Omega$

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$V_{DS} = 10\text{V}$ , $I_D = 60\text{A}$ , Note 1	45	75	S
$C_{iss}$	$V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$		11.4	nF
$C_{oss}$			2440	pF
$C_{rss}$			70	pF
$t_{d(on)}$	<b>Resistive Switching Times</b> $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$ $R_G = 1\Omega$ (External)		40	ns
$t_r$			25	ns
$t_{d(off)}$			50	ns
$t_f$			14	ns
$Q_{g(on)}$	$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$		185	nC
$Q_{gs}$			80	nC
$Q_{gd}$			60	nC
$R_{thJC}$			0.12	$^\circ\text{C/W}$
$R_{thCS}$		0.15		$^\circ\text{C/W}$

### Source-Drain Diode

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$I_S$	$V_{GS} = 0\text{V}$			170 A
$I_{SM}$	Repetitive, pulse width limited by $T_{JM}$			510 A
$V_{SD}$	$I_F = 85\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1			1.3 V
$t_{rr}$	$I_F = 85\text{A}$ , $-di/dt = 150\text{A}/\mu\text{s}$ $V_R = 100\text{V}$ , $V_{GS} = 0\text{V}$		1.6	200 ns
$Q_{RM}$				$\mu\text{C}$
$I_{RM}$			20	A

Note 1: Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

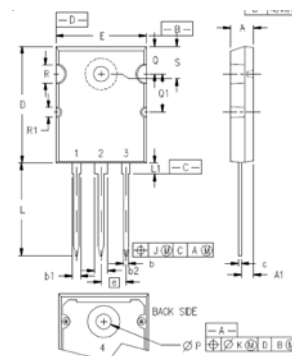
### PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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IXYS MOSFETs and IGBTs are covered 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 7,005,734 B2 7,157,338B2  
by one or more of the following U.S. patents: 4,850,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692 7,063,975 B2  
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 7,071,537

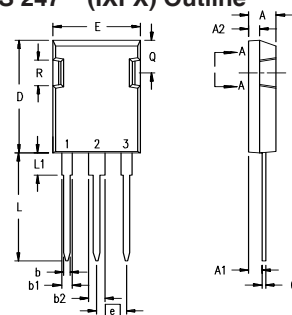
### TO-264 (IXFK) Outline



1 - GATE  
2, 4 - DRAIN (COLLECTOR)  
3 - SOURCE (EMITTER)

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.209	4.70	5.31
A1	.102	.118	2.59	3.00
b	.037	.055	0.94	1.40
b1	.087	.102	2.21	2.59
b2	.110	.126	2.79	3.20
c	.017	.029	0.43	0.74
D	1.007	1.047	25.58	26.59
e	.760	.799	19.30	20.29
e	.215BSC		5.46 BSC	
J	.000	.010	0.00	0.25
K	.000	.010	0.00	0.25
L	.779	.842	19.79	21.39
L1	.087	.102	2.21	2.59
ØP	.122	.138	3.10	3.51
Q	.240	.256	6.10	6.50
Q1	.330	.346	8.38	8.79
ØR	.155	.187	3.94	4.75
ØR1	.085	.093	2.16	2.36
S	.243	.253	6.17	6.43

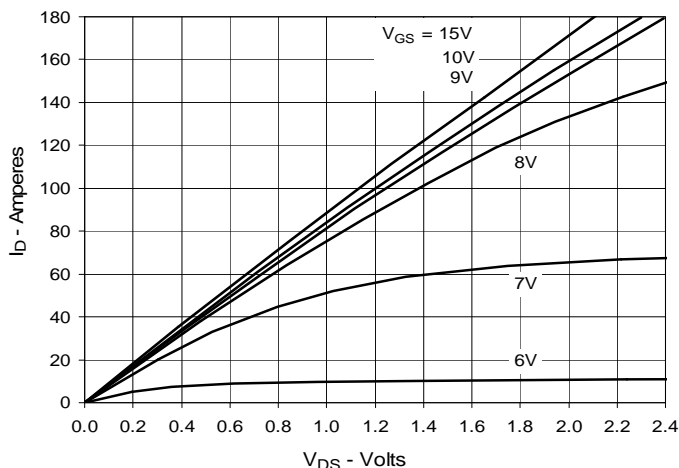
### PLUS 247™ (IXFX) Outline



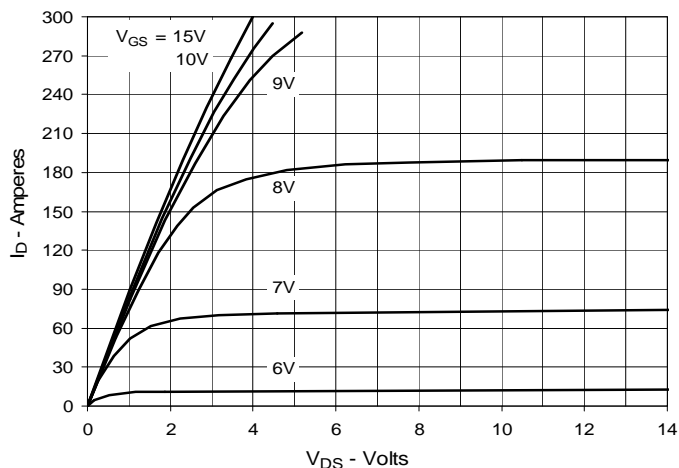
Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)  
4 - Drain (Collector)

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A <sub>1</sub>	2.29	2.54	.090	.100
A <sub>2</sub>	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b <sub>1</sub>	1.91	2.13	.075	.084
b <sub>2</sub>	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	0.244
R	4.32	4.83	.170	.190

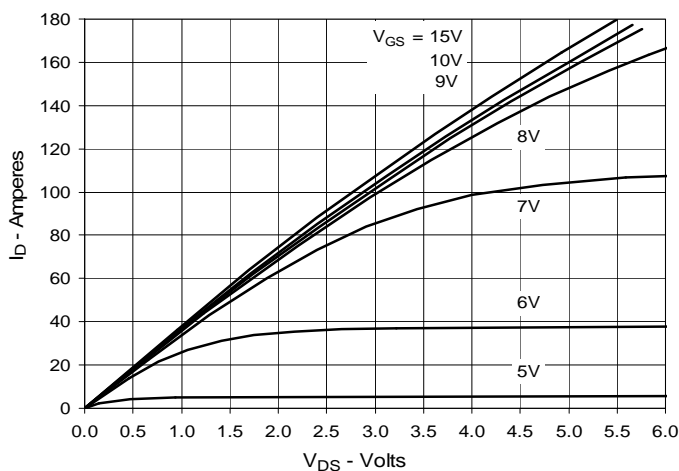
**Fig. 1. Output Characteristics @ 25°C**



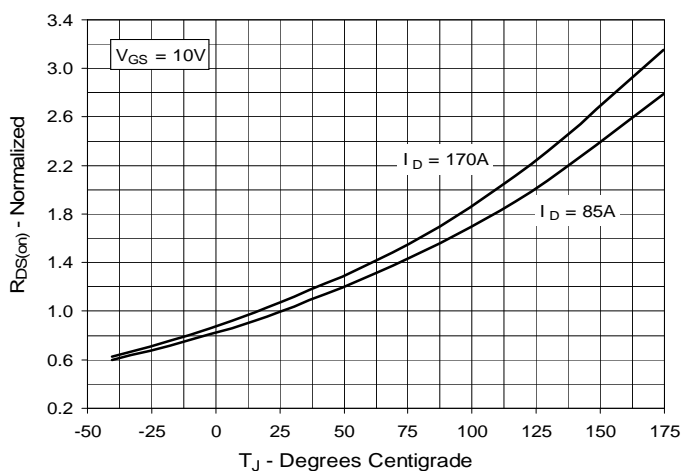
**Fig. 2. Extended Output Characteristics @ 25°C**



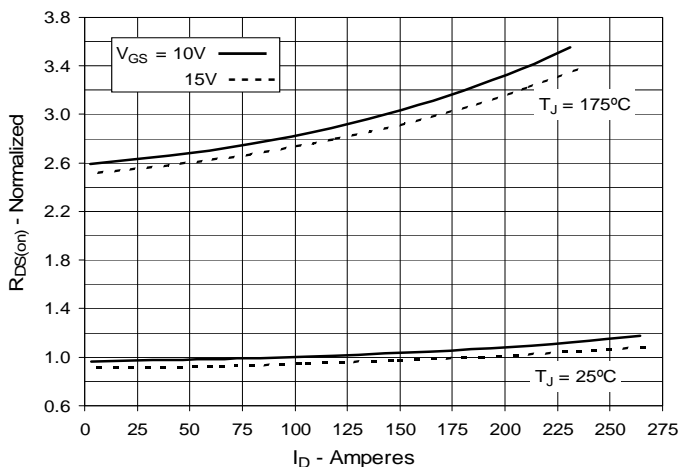
**Fig. 3. Output Characteristics @ 150°C**



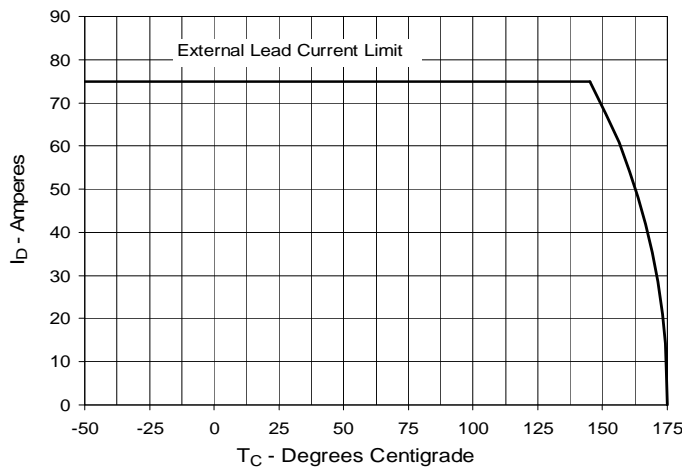
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 85A$  Value vs. Junction Temperature**



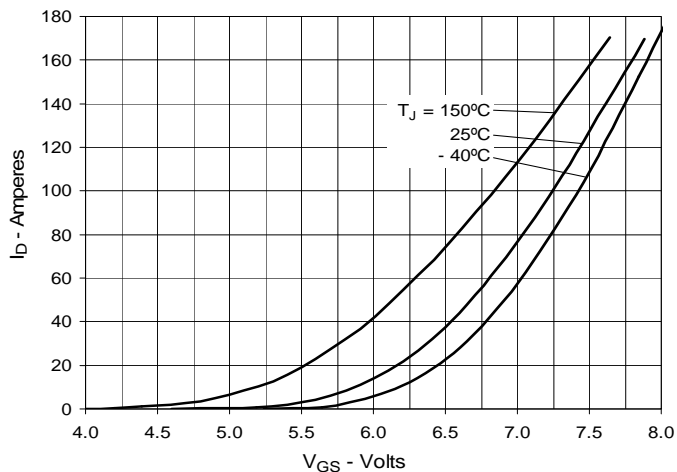
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 85A$  Value vs. Drain Current**



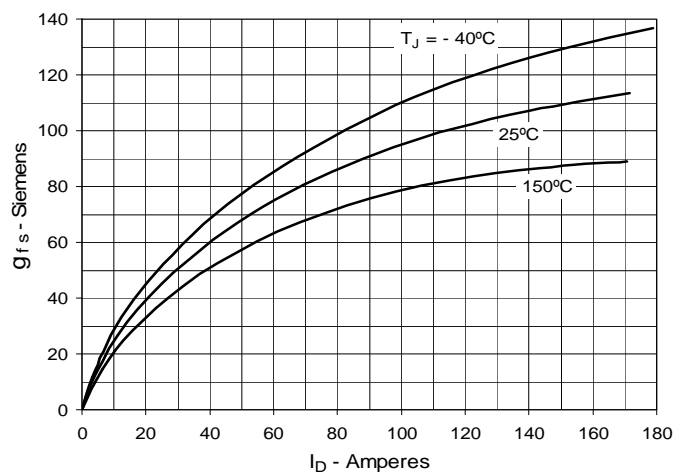
**Fig. 6. Maximum Drain Current vs. Case Temperature**



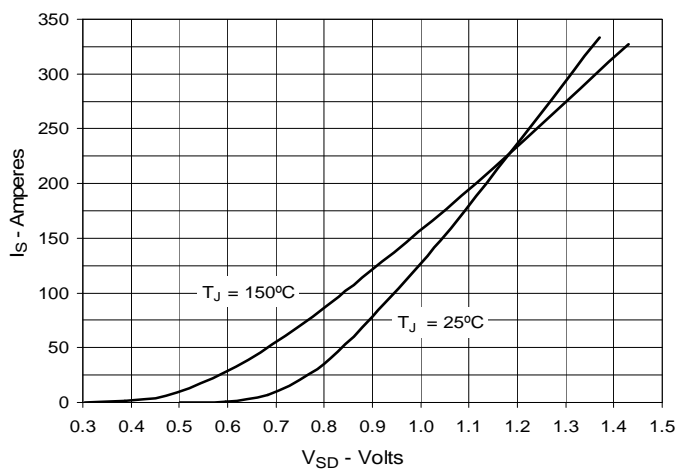
**Fig. 7. Input Admittance**



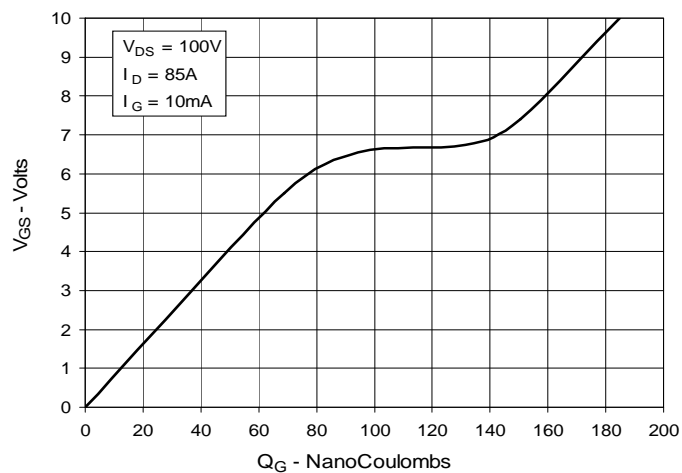
**Fig. 8. Transconductance**



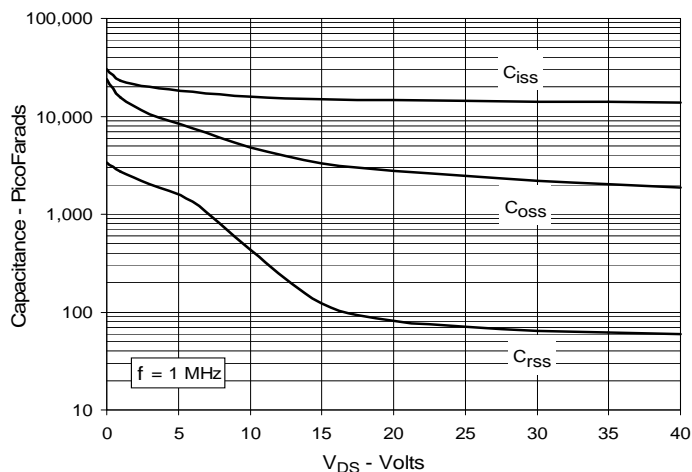
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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

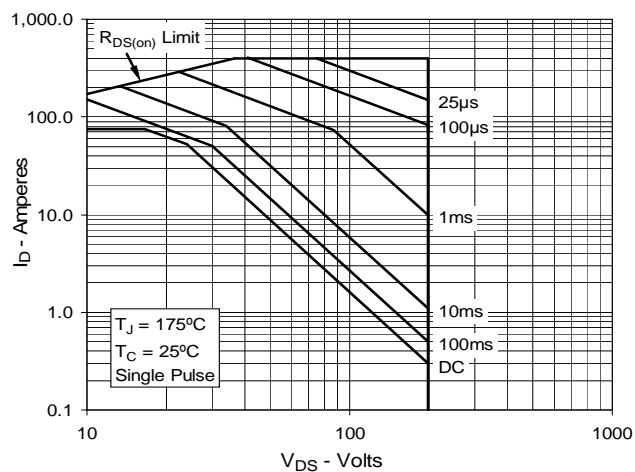


Fig. 13. Maximum Transient Thermal Impedance

