

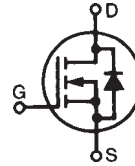
# PolarHT™ HiPerFET Power MOSFET

**IXFH 170N10P**  
**IXFK 170N10P**

$V_{DSS} = 100 \text{ V}$   
 $I_{D25} = 170 \text{ A}$   
 $R_{DS(on)} = 9.0 \text{ m}\Omega$

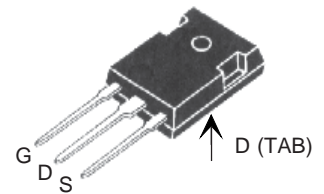
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N-Channel Enhancement Mode  
Preliminary Data Sheet

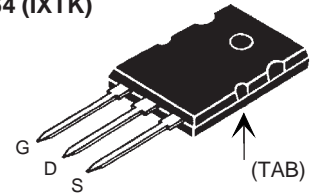


Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$	100	V
$V_{DGR}$	$T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$	100	V
$V_{GSM}$		$\pm 20$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	170	A
$I_{D(RMS)}$	External lead current limit	75	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$	350	A
$I_{AR}$	$T_C = 25^\circ\text{C}$	60	A
$E_{AR}$	$T_C = 25^\circ\text{C}$	80	mJ
$E_{AS}$	$T_C = 25^\circ\text{C}$	2.0	J
$dv/dt$	$I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ , $R_G = 4 \Omega$	10	V/ns
$P_D$	$T_C = 25^\circ\text{C}$	714	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	$^\circ\text{C}$
$M_d$	Mounting torque (TO-3P)	1.13/10	Nm/lb.in.
Weight	TO-3P	5.5	g
	TO-264	10	g
	TO-268	5.0	g

TO-247 (IXFH)



TO-264 (IXTK)



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

### Features

- International standard packages
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
  - easy to drive and to protect

### Advantages

- Easy to mount
- Space savings
- High power density

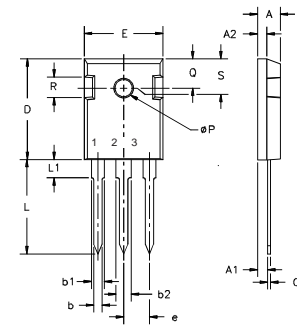
Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_{DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$	100		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 4 \text{ mA}$	2.5		5.0 V
$I_{GSS}$	$V_{GS} = \pm 20 \text{ V}_{DC}$ , $V_{DS} = 0$			$\pm 100 \text{ nA}$
$I_{DSS}$	$V_{DS} = V_{DSS}$ $V_{GS} = 0 \text{ V}$ $T_J = 125^\circ\text{C}$			25 $\mu\text{A}$
				250 $\mu\text{A}$
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$ $V_{GS} = 15 \text{ V}$ , $I_D = 350 \text{ A}$ Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2\%$	7.0		9.0 $\text{m}\Omega$
				$\text{m}\Omega$

Symbol	Test Conditions	Characteristic Values		
		(T <sub>J</sub> = 25°C, unless otherwise specified)		
		Min.	Typ.	Max.
<b>g<sub>fs</sub></b>	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 0.5 I <sub>D25</sub> , pulse test	50	72	S
<b>C<sub>iss</sub></b>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		6000	pF
<b>C<sub>oss</sub></b>			2340	pF
<b>C<sub>rss</sub></b>			730	pF
<b>t<sub>d(on)</sub></b>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 60 A R <sub>G</sub> = 3.3 Ω (External)		35	ns
<b>t<sub>r</sub></b>			50	ns
<b>t<sub>d(off)</sub></b>			90	ns
<b>t<sub>f</sub></b>			33	ns
<b>Q<sub>g(on)</sub></b>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 0.5 I <sub>D25</sub>		198	nC
<b>Q<sub>gs</sub></b>			39	nC
<b>Q<sub>gd</sub></b>			107	nC
<b>R<sub>thJC</sub></b>				0.21 K/W
<b>R<sub>thCK</sub></b>	(TO-3P)	0.21		K/W
	(TO-264)	0.15		K/W

Symbol	Test Conditions	Characteristic Values		
		(T <sub>J</sub> = 25°C, unless otherwise specified)		
		Min.	typ.	Max.
<b>I<sub>s</sub></b>	V <sub>GS</sub> = 0 V			170 A
<b>I<sub>SM</sub></b>	Repetitive			350 A
<b>V<sub>SD</sub></b>	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
<b>t<sub>rr</sub></b>	I <sub>F</sub> = 25 A -di/dt = 100 A/μs		100	ns
<b>Q<sub>RM</sub></b>		V <sub>R</sub> = 50 V		0.6

### TO-247 AD Outline

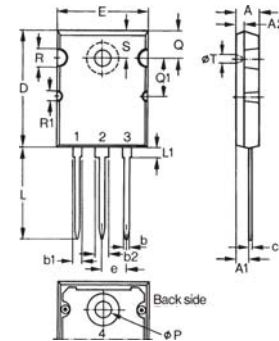
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Terminals: 1 - Gate  
2 - Drain  
3 - Source  
Tab - Drain

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A <sub>1</sub>	2.2	2.54	.087	.102
A <sub>2</sub>	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b <sub>1</sub>	1.65	2.13	.065	.084
b <sub>2</sub>	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
∅P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S		BSC	242	BSC

### TO-264 AA Outline



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.82	5.13	.190	.202
A <sub>1</sub>	2.54	2.89	.100	.114
A <sub>2</sub>	2.00	2.10	.079	.083
b	1.12	1.42	.044	.056
b <sub>1</sub>	2.39	2.69	.094	.106
b <sub>2</sub>	2.90	3.09	.114	.122
c	0.53	0.83	.021	.033
D	25.91	26.16	1.020	1.030
E	19.81	19.96	.780	.786
e		5.46 BSC		.215 BSC
J	0.00	0.25	.000	.010
K	0.00	0.25	.000	.010
L	20.32	20.83	.800	.820
L1	2.29	2.59	.090	.102
P	3.17	3.66	.125	.144
Q	6.07	6.27	.239	.247
Q1	8.38	8.69	.330	.342
R	3.81	4.32	.150	.170
R1	1.78	2.29	.070	.090
S	6.04	6.30	.238	.248
T	1.57	1.83	.062	.072

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

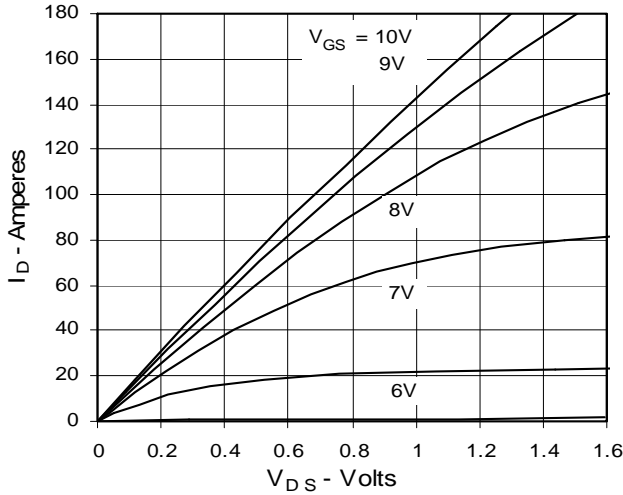
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1
4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343
4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505

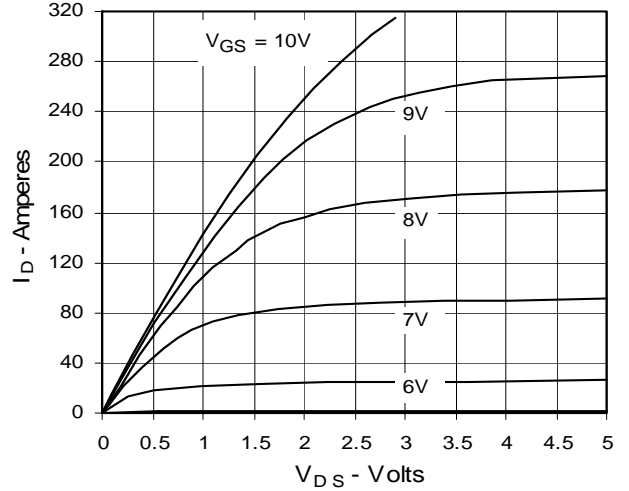
6,683,344	6,727,585
6,710,405 B2	6,759,692
6,710,463	

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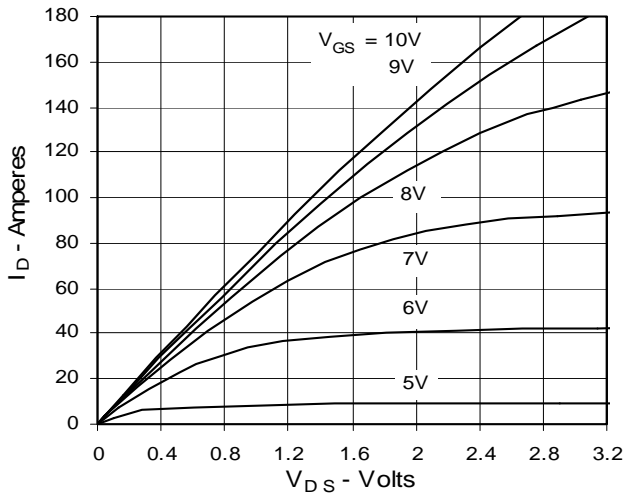
**Fig. 1. Output Characteristics @ 25°C**



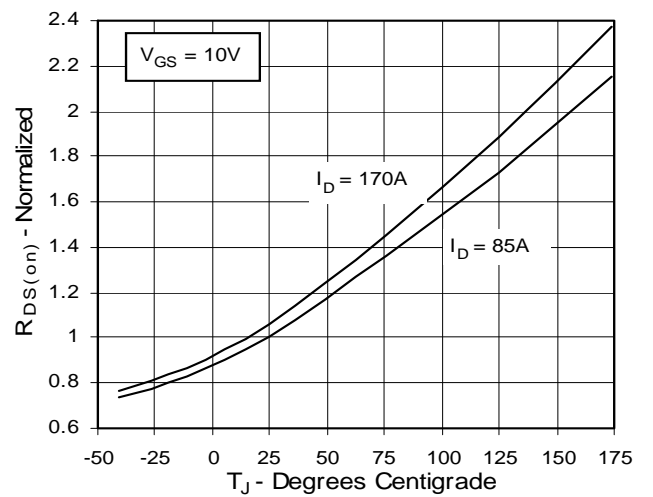
**Fig. 2. Extended Output Characteristics @ 25°C**



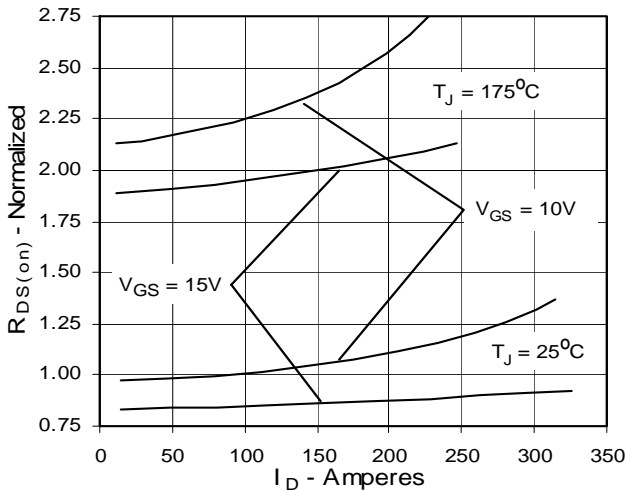
**Fig. 3. Output Characteristics @ 150°C**



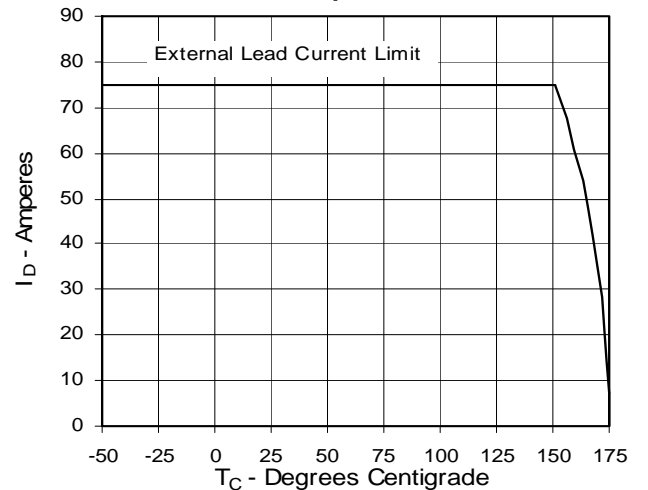
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Junction Temperature**



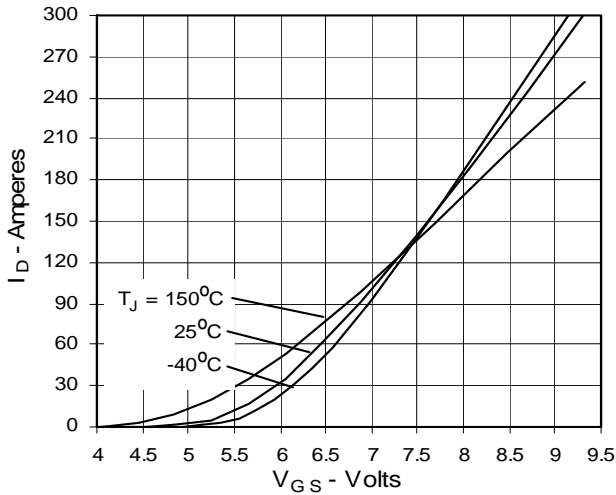
**Fig. 5.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Drain Current**



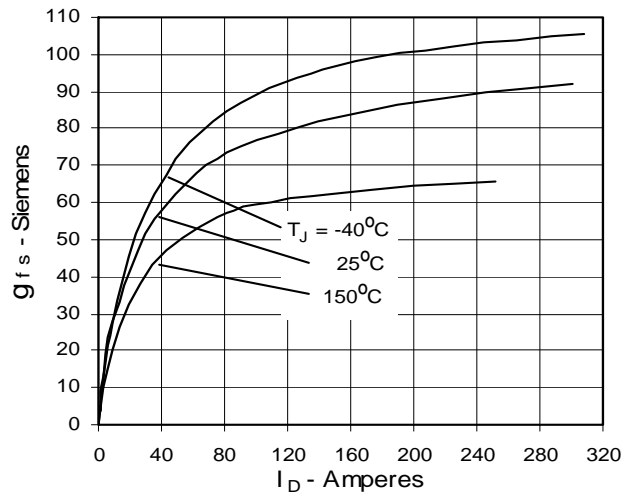
**Fig. 6. Drain Current vs. Case Temperature**



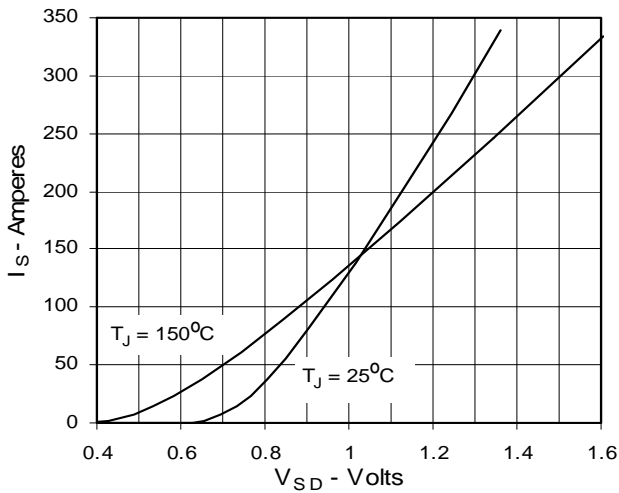
**Fig. 7. Input Admittance**



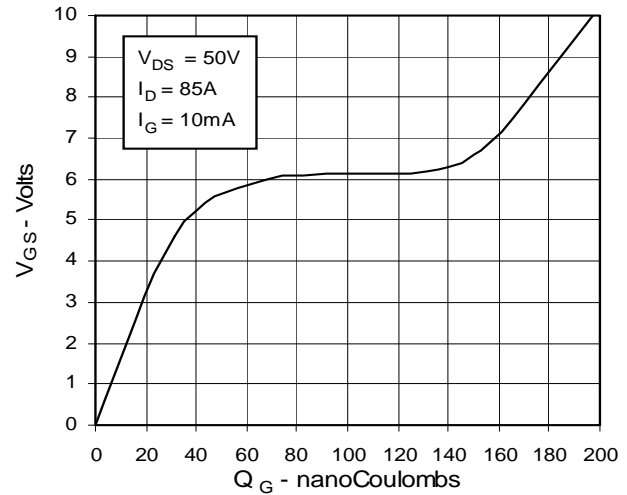
**Fig. 8. Transconductance**



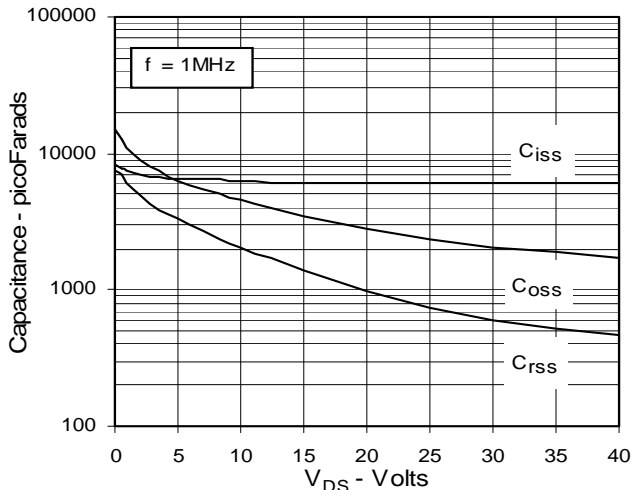
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



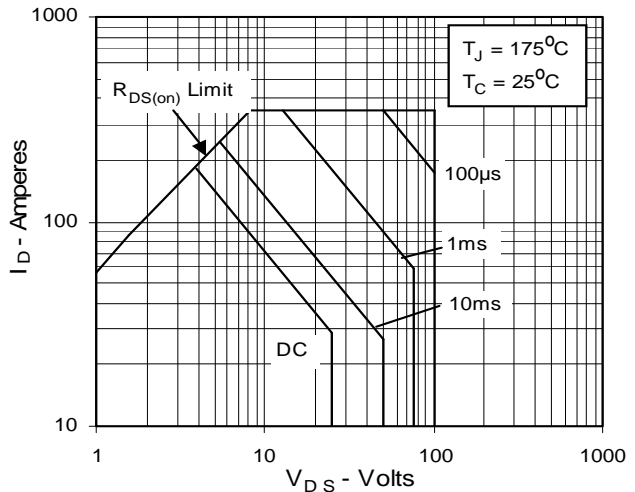
**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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



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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	

Fig. 13. Maximum Transient Thermal Resistance

