

Polar3™ HiPerFET™ Power MOSFETs

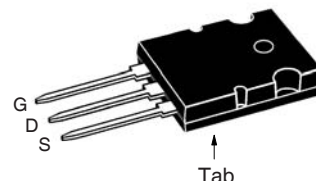
IXFK78N50P3 IXFX78N50P3

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode

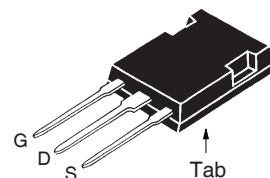


$$\begin{aligned} V_{DSS} &= 500V \\ I_{D25} &= 78A \\ R_{DS(on)} &\leq 68m\Omega \\ t_{rr} &\leq 250ns \end{aligned}$$

TO-264 (IXFK)



PLUS247 (IXFX)



G = Gate D = Drain
S = Source Tab = Drain

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	$T_J = 25^\circ\text{C}$ to 150°C	500	V
V_{DGR}	$T_J = 25^\circ\text{C}$ to 150°C , $R_{GS} = 1M\Omega$	500	V
V_{GSS}	Continuous	± 30	V
V_{GSM}	Transient	± 40	V
I_{D25}	$T_C = 25^\circ\text{C}$	78	A
I_{DM}	$T_C = 25^\circ\text{C}$, Pulse Width Limited by T_{JM}	200	A
I_A	$T_C = 25^\circ\text{C}$	39	A
E_{AS}	$T_C = 25^\circ\text{C}$	1.5	J
P_D	$T_C = 25^\circ\text{C}$	1130	W
dv/dt	$I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$	35	V/ns
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ\text{C}$
T_{SOLD}	Plastic Body for 10s	260	$^\circ\text{C}$
M_d	Mounting Torque (TO-264)	1.13/10	Nm/lb.in
F_C	Mounting Force (PLUS247)	20..120 / 4.5..27	N/lb
Weight	TO-264	10	g
	PLUS247	6	g

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{DSS}	$V_{GS} = 0V$, $I_D = 1mA$	500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 4mA$	3.0		5.0 V
I_{GSS}	$V_{GS} = \pm 30V$, $V_{DS} = 0V$			± 200 nA
I_{DSS}	$V_{DS} = V_{DSS}$, $V_{GS} = 0V$ $T_J = 125^\circ\text{C}$			25 μA 3 mA
$R_{DS(on)}$	$V_{GS} = 10V$, $I_D = 0.5 \cdot I_{D25}$, Note 1			68 m Ω

Features

- Dynamic dv/dt Rating
- Avalanche Rated
- Fast Intrinsic Diode
- Low Q_G
- Low $R_{DS(on)}$
- Low Drain-to-Tab Capacitance
- Low Package Inductance

Advantages

- Easy to Mount
- Space Savings

Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- Uninterrupted Power Supplies
- AC Motor Drives
- High Speed Power Switching Applications

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$V_{DS} = 10\text{V}$, $I_D = 0.5 \cdot I_{D25}$, Note 1	40	75	S
C_{iss}	$V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$		9.9	nF
C_{oss}			970	pF
C_{rss}			5.0	pF
R_{Gi}	Gate Input Resistance		1.1	Ω
$t_{d(on)}$	Resistive Switching Times $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ $R_G = 1\Omega$ (External)		30	ns
t_r			10	ns
$t_{d(off)}$			60	ns
t_f			7	ns
$Q_{g(on)}$	$V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$		147	nC
Q_{gs}			50	nC
Q_{gd}			38	nC
R_{thJC}			0.11	$^\circ\text{C/W}$
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	$V_{GS} = 0\text{V}$			78 A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			310 A
V_{SD}	$I_F = I_S$, $V_{GS} = 0\text{V}$, Note 1			1.5 V
t_{rr}	$I_F = 39\text{A}$, $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$, $V_{GS} = 0\text{V}$		1.2	ns
Q_{RM}			13.0	μC
I_{RM}				A

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

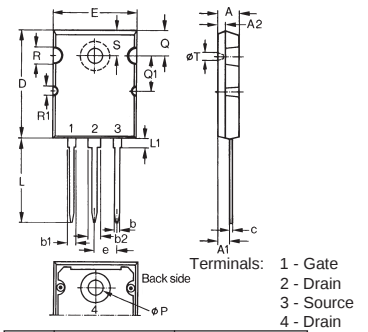
PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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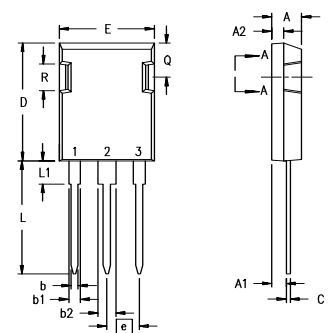
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:	4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2	7,157,338B2
	4,860,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692	7,063,975 B2	
	4,881,106	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 AA Outline



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.82	5.13	.190	.202
A1	2.54	2.89	.100	.114
A2	2.00	2.10	.079	.083
b	1.12	1.42	.044	.056
b1	2.39	2.69	.094	.106
b2	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

PLUS 247™ Outline



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A1	2.29	2.54	.090	.100
A2	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b1	1.91	2.13	.075	.084
b2	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 @ $T_J = 25^\circ\text{C}$

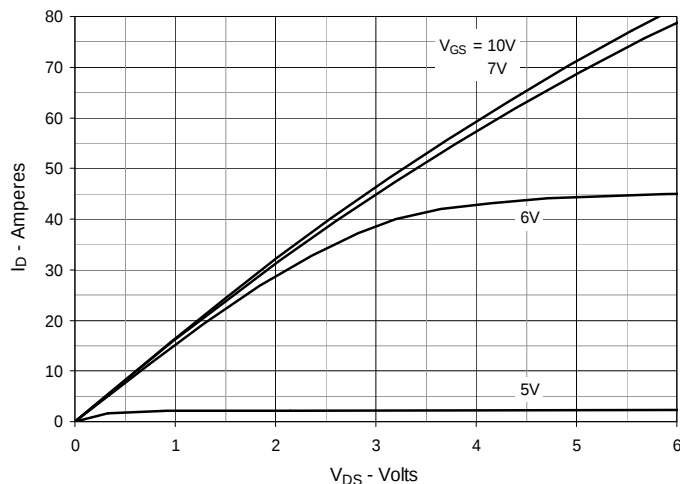


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

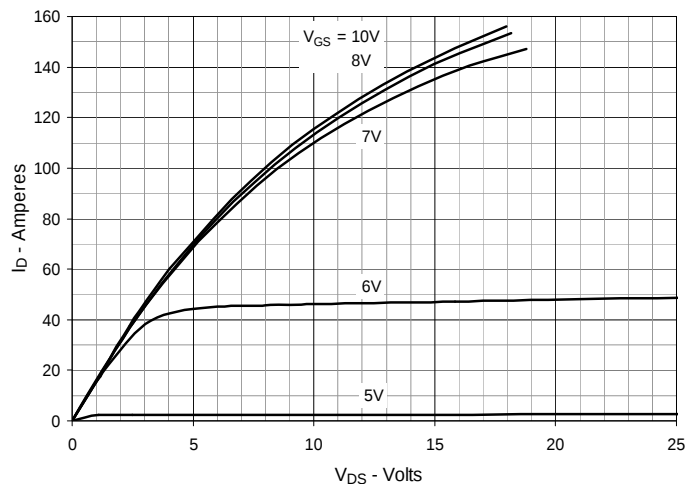


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

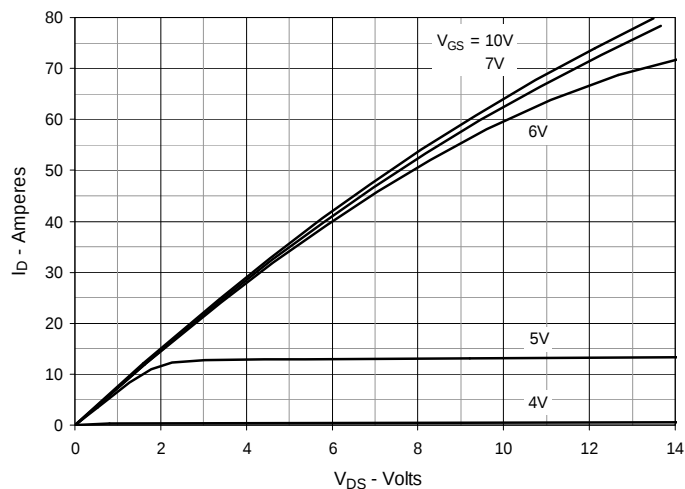


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 39\text{A}$ Value vs. Junction Temperature

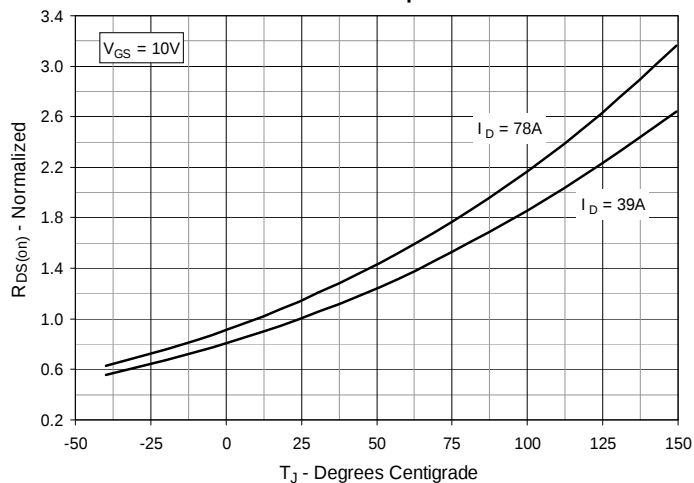


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 39\text{A}$ Value vs. Drain Current

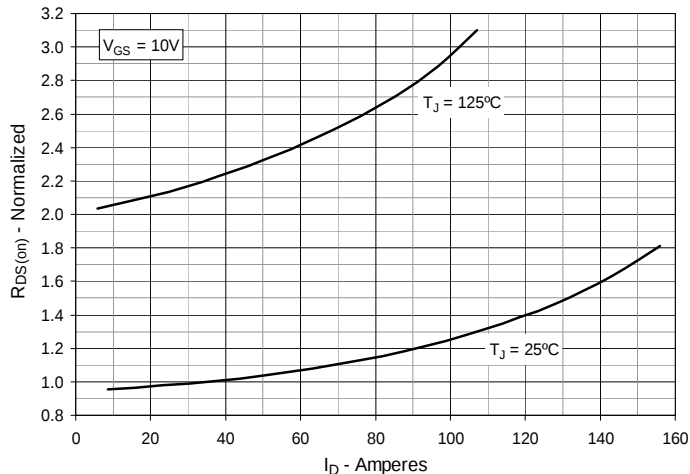


Fig. 6. Maximum Drain Current vs. Case Temperature

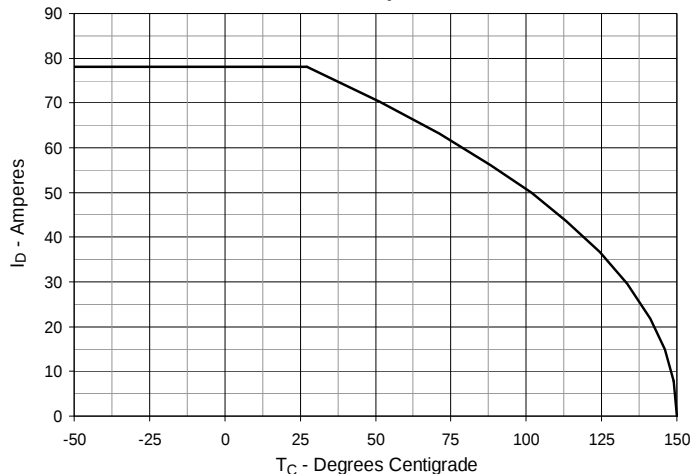


Fig. 7. Input Admittance

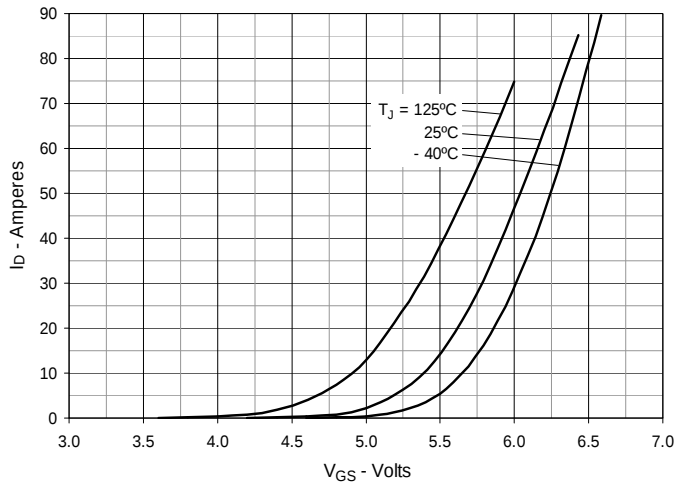


Fig. 8. Transconductance

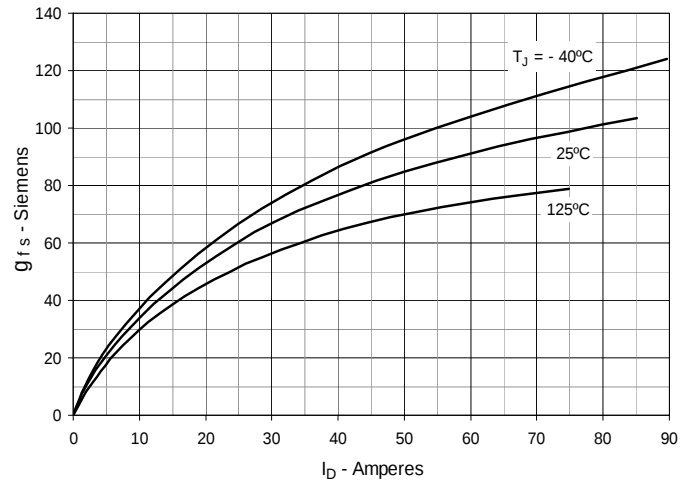


Fig. 9. Forward Voltage Drop of Intrinsic Diode

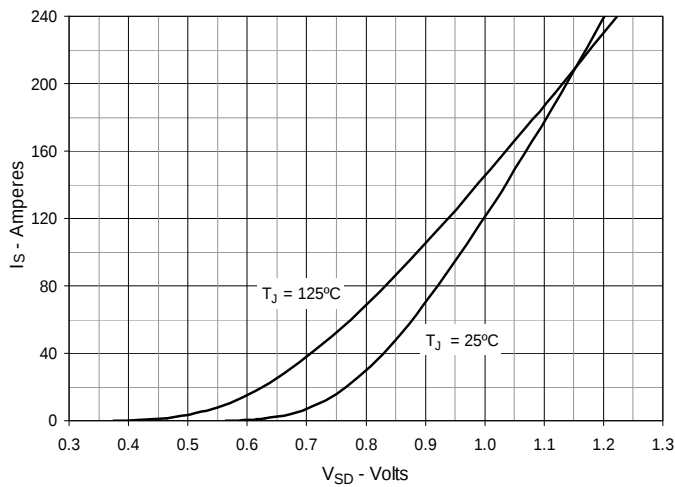


Fig. 10. Gate Charge

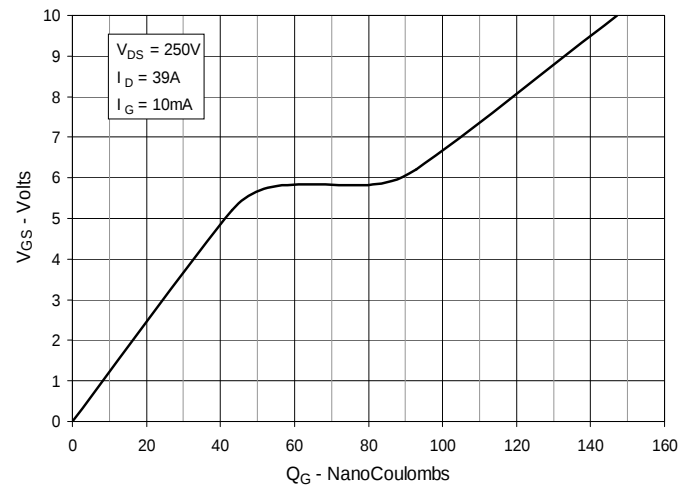


Fig. 11. Capacitance

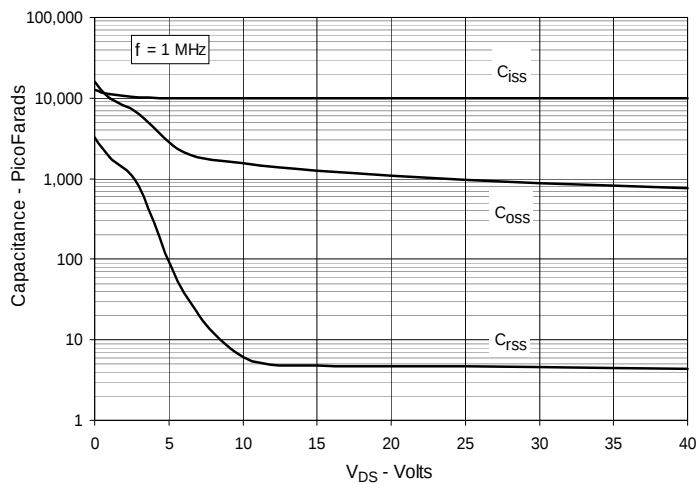


Fig. 12. Forward-Bias Safe Operating Area

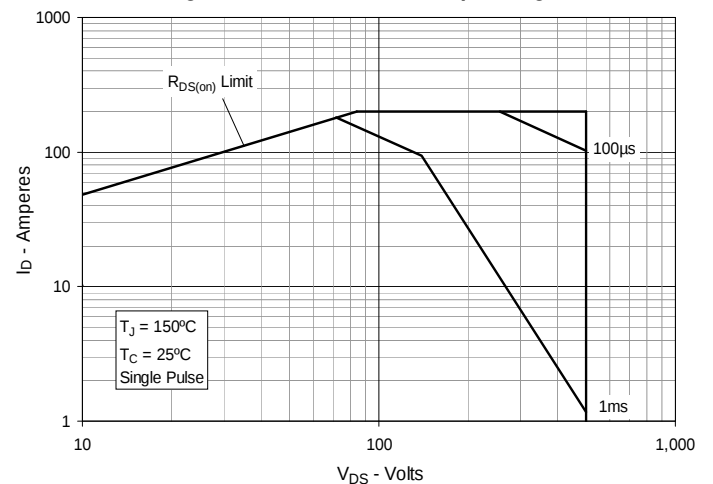


Fig. 13. Maximum Transient Thermal Impedance

