

## PolarP™ Power MOSFET

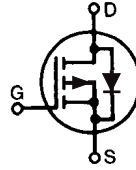
## IXTK40P50P IXTX40P50P

$$V_{DSS} = -500V$$

$$I_{D25} = -40A$$

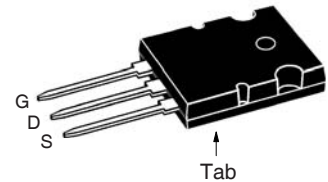
$$R_{DS(on)} \leq 230m\Omega$$

P-Channel Enhancement Mode  
Avalanche Rated

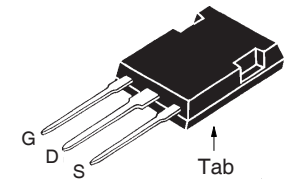


Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ C$ to $150^\circ C$	- 500	V
$V_{DGR}$	$T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$	- 500	V
$V_{GSS}$	Continuous	$\pm 20$	V
$V_{GSM}$	Transient	$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ C$	- 40	A
$I_{DM}$	$T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$	- 120	A
$I_A$	$T_C = 25^\circ C$	- 40	A
$E_{AS}$	$T_C = 25^\circ C$	3.5	J
$dv/dt$	$I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$	10	V/ns
$P_D$	$T_C = 25^\circ C$	890	W
$T_J$		-55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		-55 ... +150	$^\circ C$
$T_L$	Maximum Lead Temperature for Soldering	300	$^\circ C$
$T_{SOLD}$	1.6 mm (0.062in.) from Case for 10s	260	$^\circ C$
$M_d$	Mounting Force (PLUS247)	20..120/4.5..27	N/lb
	Mounting Torque (TO-264)	1.13/10	Nm/lb.in
<b>Weight</b>	PLUS247	6	g
	TO-264	10	g

TO-264 (IXTK)



PLUS247 (IXTX)



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

### Features

- International Standard Packages
- Rugged PolarP™ Process
- Avalanche Rated
- Fast Intrinsic Diode
- Low Package Inductance

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

### Applications

- High-Side Switches
- Push Pull Amplifiers
- DC Choppers
- Automatic Test Equipment
- Current Regulators

Symbol	Test Conditions ( $T_J = 25^\circ C$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0V$ , $I_D = -250\mu A$	- 500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = -1mA$	- 2.0		- 4.5 V
$I_{GSS}$	$V_{GS} = \pm 20V$ , $V_{DS} = 0V$			$\pm 100$ nA
$I_{DSS}$	$V_{DS} = V_{DSS}$ , $V_{GS} = 0V$ $T_J = 125^\circ C$			- 50 $\mu A$ - 250 $\mu A$
$R_{DS(on)}$	$V_{GS} = -10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1			230 m $\Omega$

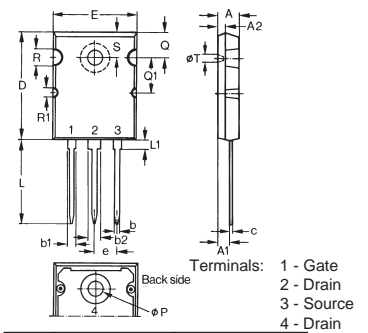
Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$V_{DS} = -10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1	23	38	S
$C_{iss}$	$V_{GS} = 0\text{V}$ , $V_{DS} = -25\text{V}$ , $f = 1\text{MHz}$		11.5	nF
$C_{oss}$			1150	pF
$C_{rss}$			93	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)		37	ns
$t_r$			59	ns
$t_{d(off)}$			90	ns
$t_f$			34	ns
$Q_{g(on)}$	$V_{GS} = -10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$		205	nC
$Q_{gs}$			55	nC
$Q_{gd}$			75	nC
$R_{thJC}$			0.14	$^\circ\text{C/W}$
$R_{thCS}$		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.
$I_S$	$V_{GS} = 0\text{V}$			-40 A
$I_{SM}$	Repetitive, Pulse Width Limited by $T_{JM}$			-160 A
$V_{SD}$	$I_F = -20\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1			-3.0 V
$t_{rr}$	$I_F = -20\text{A}$ , $-di/dt = -150\text{A}/\mu\text{s}$ $V_R = -100\text{V}$ , $V_{GS} = 0\text{V}$		477	ns
$Q_{RM}$			14.5	$\mu\text{C}$
$I_{RM}$			-61	A

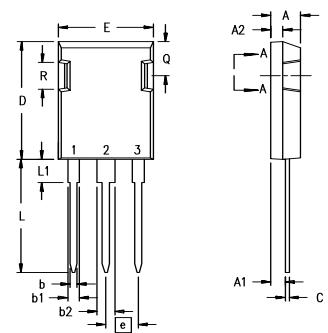
Note 1: Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

### 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

### PLUS247™ Outline



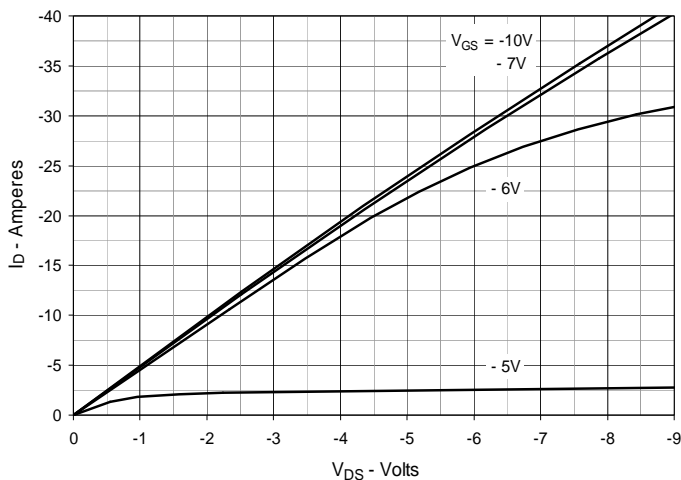
Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A <sub>1</sub>	2.29	2.54	.090	.100
A <sub>2</sub>	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b <sub>1</sub>	1.91	2.13	.075	.084
b <sub>2</sub>	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	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

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

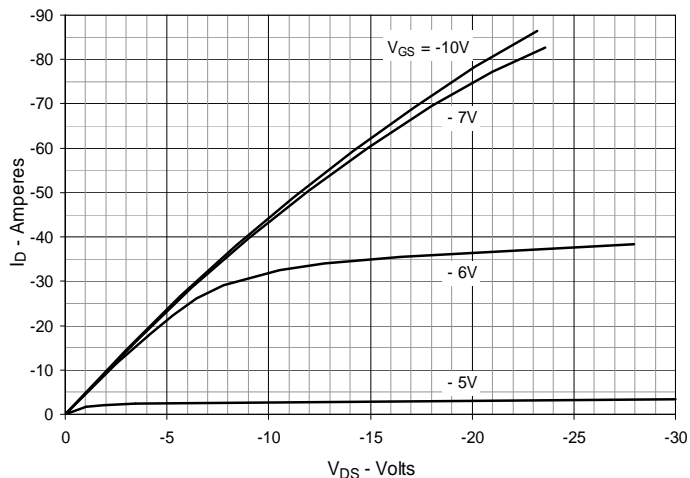
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

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	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	

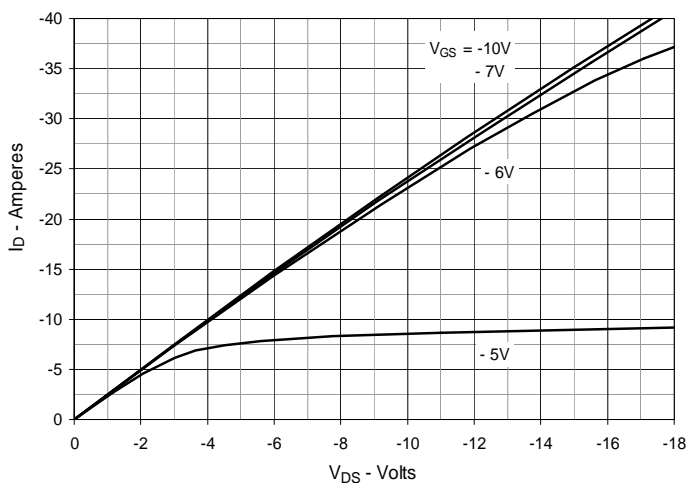
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



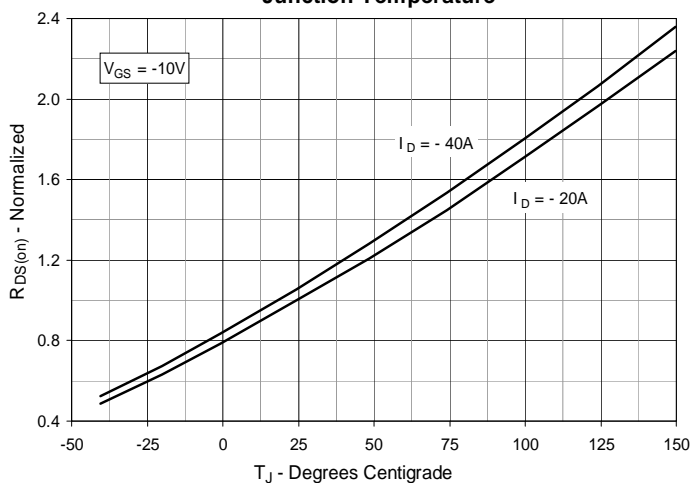
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



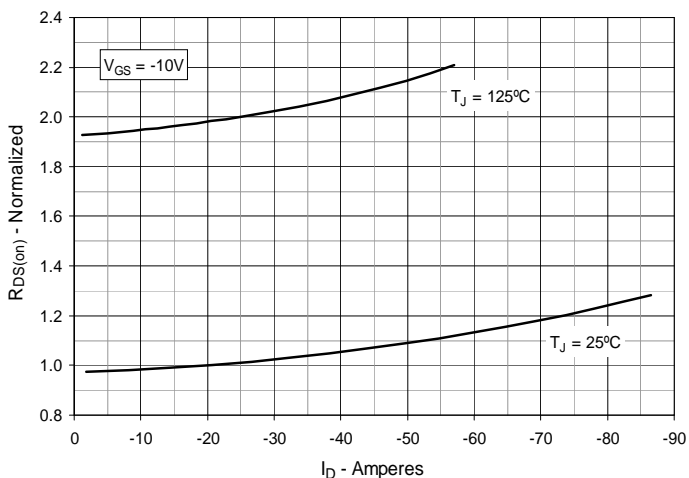
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



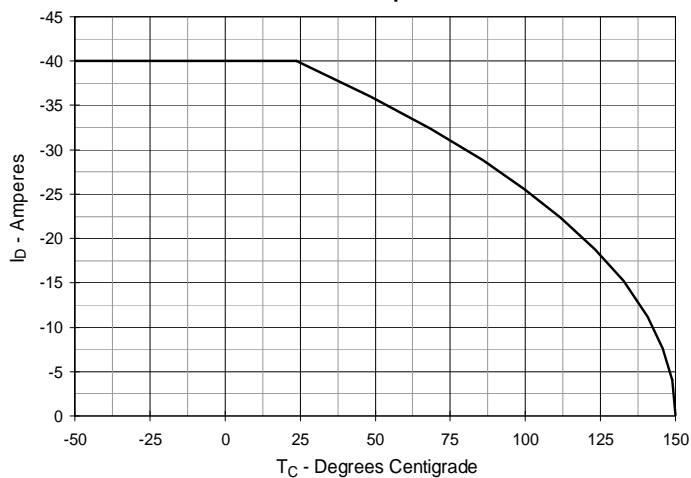
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = -20\text{A}$  Value vs. Junction Temperature**



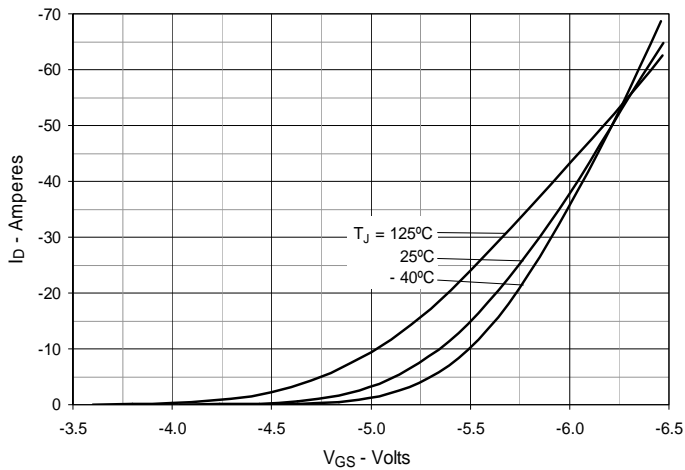
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = -20\text{A}$  Value vs. Drain Current**



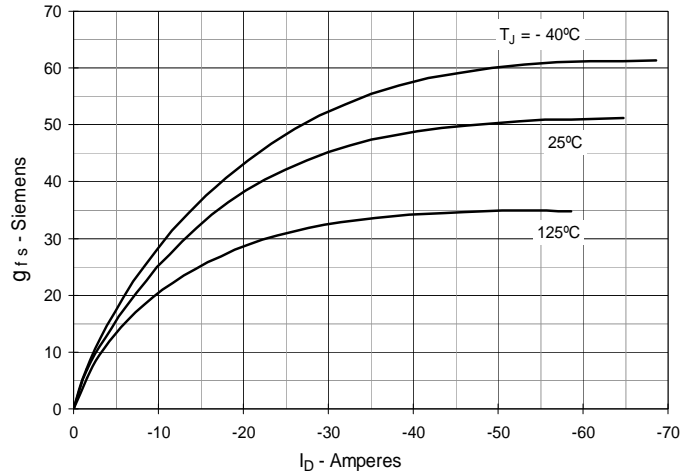
**Fig. 6. Maximum Drain Current vs. Case Temperature**



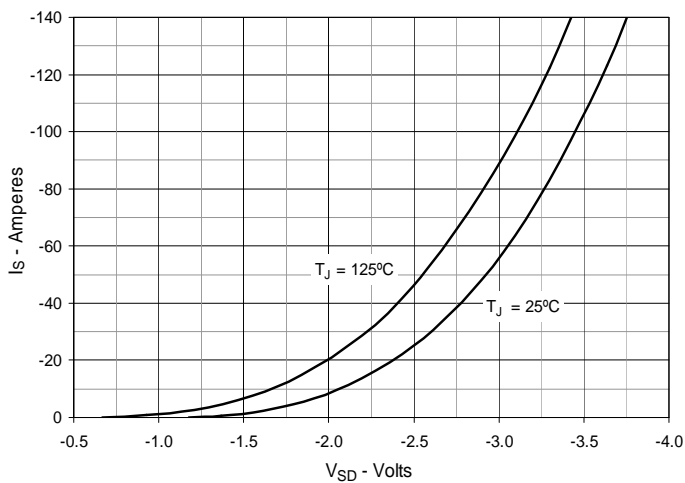
**Fig. 7. Input Admittance**



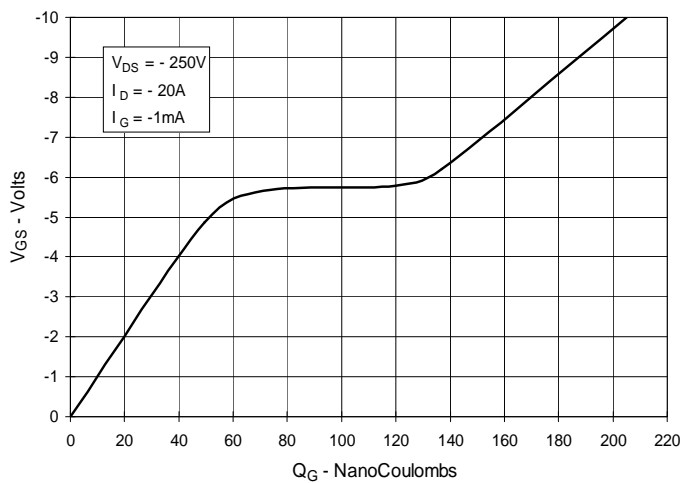
**Fig. 8. Transconductance**



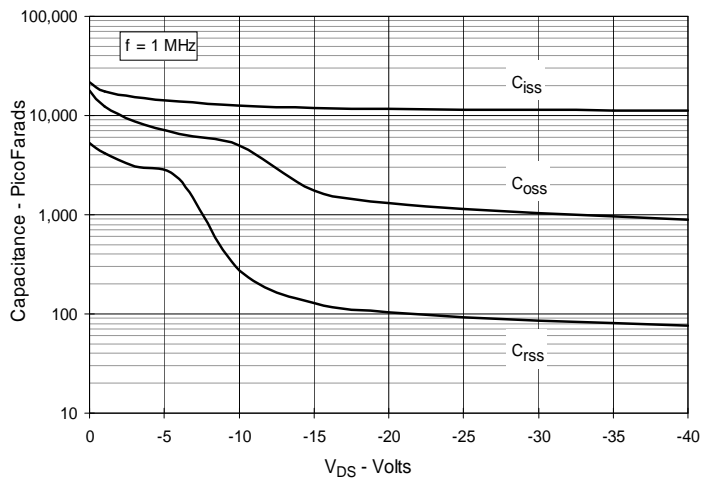
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



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

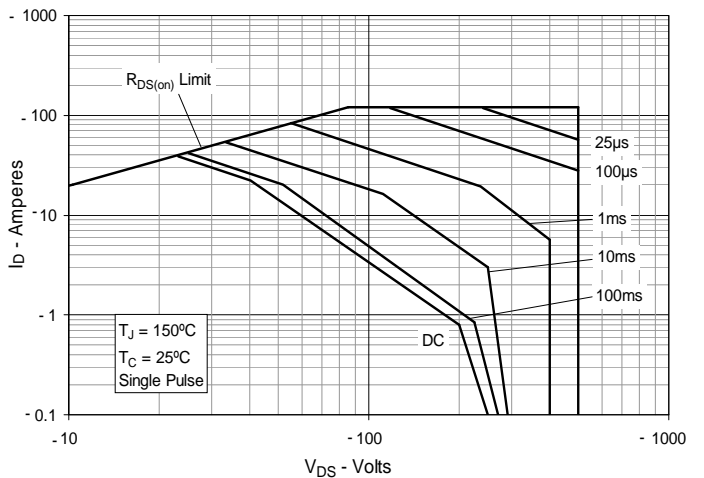


Fig. 13. Maximum Transient Thermal Impedance

