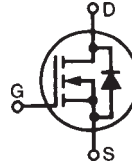


# PolarHV™ Power MOSFET

**IXTA 6N50P**  
**IXTP 6N50P**

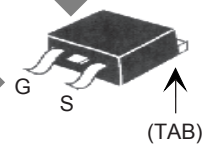
$V_{DSS} = 500 \text{ V}$   
 $I_{D25} = 6 \text{ A}$   
 $R_{DS(on)} \leq 1.1 \text{ } \Omega$

N-Channel Enhancement Mode  
Avalanche Rated

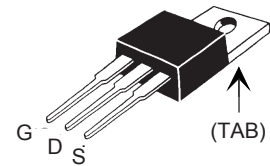


Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ \text{C to } 150^\circ \text{C}$	500	V
$V_{DGR}$	$T_J = 25^\circ \text{C to } 150^\circ \text{C}; R_{GS} = 1 \text{ M}\Omega$	500	V
$V_{GSS}$	Continuous	$\pm 30$	V
$V_{GSM}$	Transient	$\pm 40$	V
$I_{D25}$	$T_C = 25^\circ \text{C}$	6	A
$I_{DM}$	$T_C = 25^\circ \text{C}$ , pulse width limited by $T_{JM}$	15	A
$I_{AR}$	$T_C = 25^\circ \text{C}$	6	A
$E_{AR}$	$T_C = 25^\circ \text{C}$	20	mJ
$E_{AS}$	$T_C = 25^\circ \text{C}$	250	mJ
$dv/dt$	$I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ \text{C}$ , $R_G = 18 \text{ } \Omega$	10	V/ns
$P_D$	$T_C = 25^\circ \text{C}$	100	W
$T_J$		-55 ... +150	$^\circ \text{C}$
$T_{JM}$		150	$^\circ \text{C}$
$T_{stg}$		-55 ... +150	$^\circ \text{C}$
$T_L$	1.6 mm (0.062 in.) from case for 10 s	300	$^\circ \text{C}$
$T_{SOLD}$	Plastic body for 10 s	260	$^\circ \text{C}$
$M_d$	Mounting torque (TO-220)	1.13/10	Nm/lb.in.
Weight	TO-220	4	g
	TO-263	3	g

TO-263 (IXTA)



TO-220 (IXTP)



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

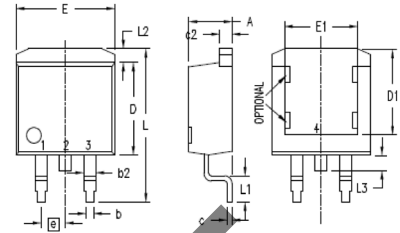
Symbol	Test Conditions ( $T_J = 25^\circ \text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \text{ } \mu\text{A}$	500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 50 \text{ } \mu\text{A}$	3.0		5.0 V
$I_{GSS}$	$V_{GS} = \pm 30 \text{ V}$ , $V_{DS} = 0 \text{ V}$			$\pm 100 \text{ nA}$
$I_{DSS}$	$V_{DS} = V_{DSS}$			5 $\mu\text{A}$
	$V_{GS} = 0 \text{ V}$ $T_J = 125^\circ \text{C}$			50 $\mu\text{A}$
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$ Pulse test, $t \leq 300 \text{ } \mu\text{s}$ , duty cycle $d \leq 2 \%$			1.1 $\Omega$

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		Min.	Typ.	Max.
$g_{fs}$	$V_{DS} = 20\text{ V}$ ; $I_D = 0.5 I_{D25}$ , pulse test	3.5	5.5	S
$C_{iss}$	$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$		740	pF
$C_{oss}$			85	pF
$C_{rss}$			8	pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 0.5 I_{D25}$ $R_G = 18\ \Omega$ (External)		26	ns
$t_r$			28	ns
$t_{d(off)}$			65	ns
$t_f$			26	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 V_{DSS}$ , $I_D = 0.5 I_{D25}$		14.6	nC
$Q_{gs}$			4.8	nC
$Q_{gd}$			5.6	nC
$R_{thJC}$	(TO-220)			$1.25^\circ\text{C/W}$
$R_{thCS}$			0.25	$^\circ\text{C/W}$

### Source-Drain Diode

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ unless otherwise specified)		
		Min.	Typ.	Max.
$I_S$	$V_{GS} = 0\text{ V}$			6 A
$I_{SM}$	Repetitive			18 A
$V_{SD}$	$I_F = I_S$ , $V_{GS} = 0\text{ V}$ , $-di/dt = 100\text{ A}/\mu\text{s}$			1.5 V
$t_{rr}$	Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$	400		ns

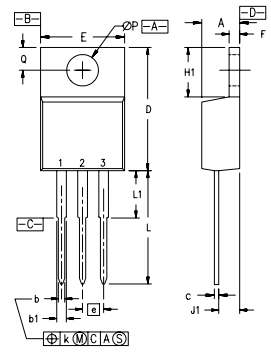
### TO-263 (IXTA) Outline



1. GATE
2. DRAIN (COLLECTOR)
3. SOURCE (EMITTER)
4. DRAIN (COLLECTOR) BOTTOM SIDE

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.160	.190	4.06	4.83
A1	.080	.110	2.03	2.79
b	.020	.039	0.51	0.99
b2	.045	.055	1.14	1.40
c	.016	.029	0.40	0.74
c2	.045	.055	1.14	1.40
D	.340	.380	8.64	9.65
D1	.315	.350	8.00	8.89
E	.380	.410	9.65	10.41
E1	.245	.320	6.22	8.13
e	.100 BSC		2.54 BSC	
L	.575	.625	14.61	15.88
L1	.090	.110	2.29	2.79
L2	.040	.055	1.02	1.40
L3	.050	.070	1.27	1.78
L4	0	.005	0	0.13

### TO-220 (IXTP) Outline



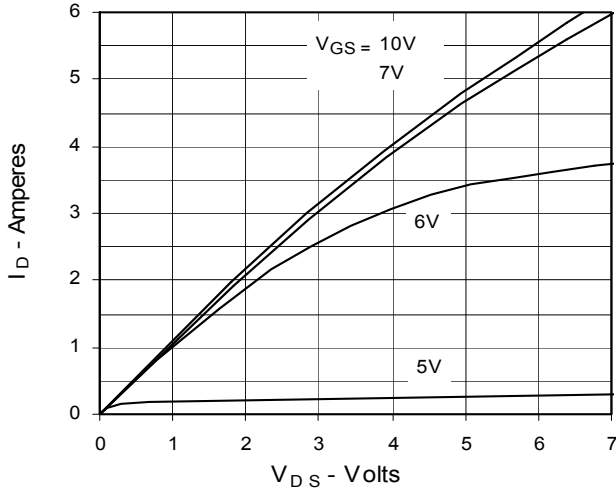
- Pins: 1 - Gate 2 - Drain  
3 - Source 4 - Drain

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.170	.190	4.32	4.83
b	.025	.040	0.64	1.02
b1	.045	.065	1.15	1.65
c	.014	.022	0.35	0.56
D	.580	.630	14.73	16.00
E	.390	.420	9.91	10.66
e	.100 BSC		2.54 BSC	
F	.045	.055	1.14	1.40
H1	.230	.270	5.85	6.85
J1	.090	.110	2.29	2.79
k	0	.015	0	0.38
L	.500	.550	12.70	13.97
L1	.110	.230	2.79	5.84
ØP	.139	.161	3.53	4.08
Q	.100	.125	2.54	3.18

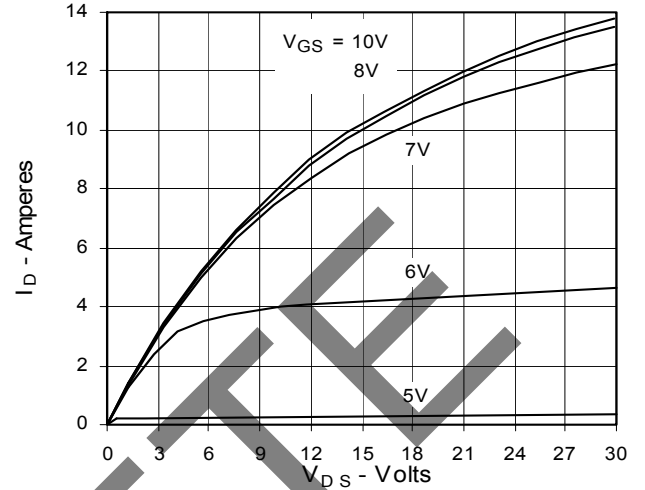
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by	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
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	6,710,405B2	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

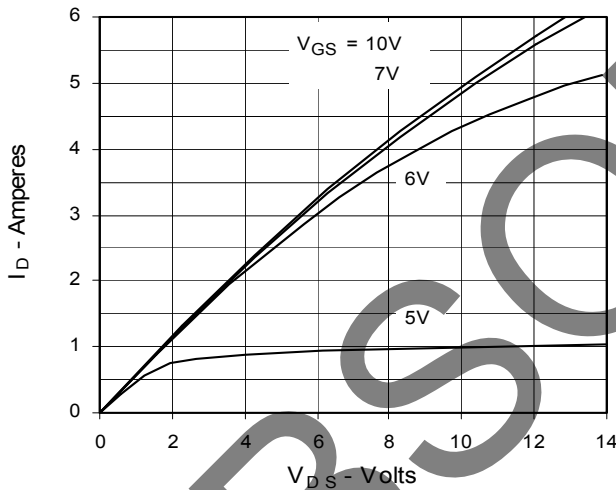
**Fig. 1. Output Characteristics**  
**@ 25°C**



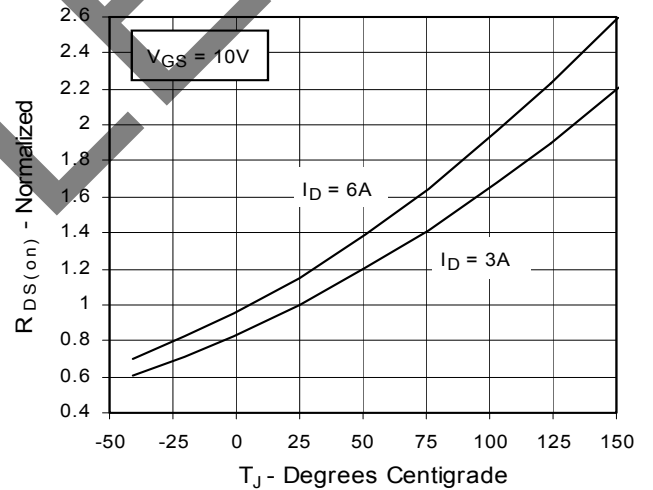
**Fig. 2. Extended Output Characteristics**  
**@ 25°C**



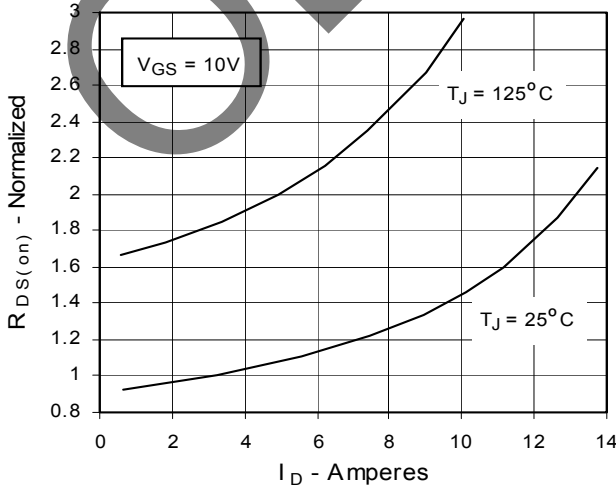
**Fig. 3. Output Characteristics**  
**@ 125°C**



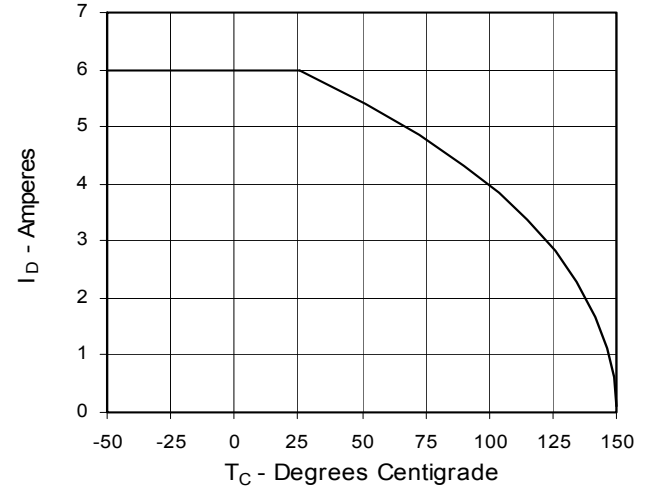
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Junction Temperature**



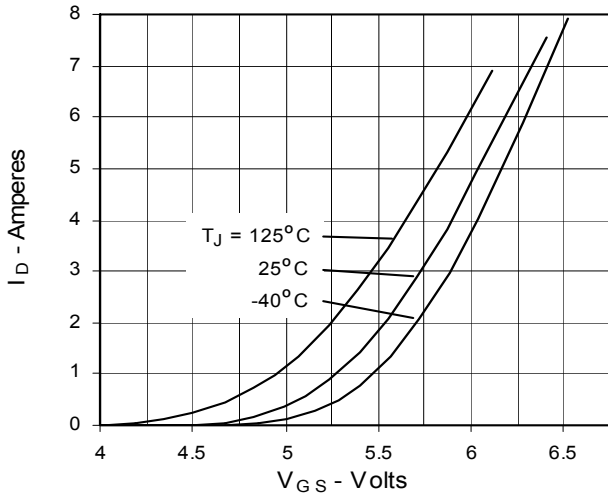
**Fig. 5.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs.  $I_D$**



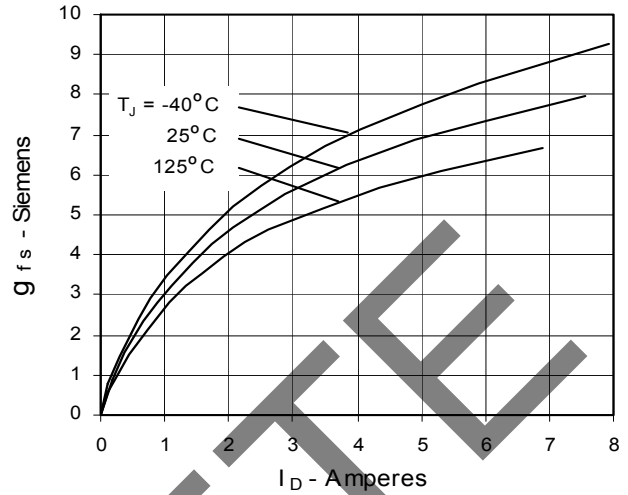
**Fig. 6. Drain Current vs. Case Temperature**



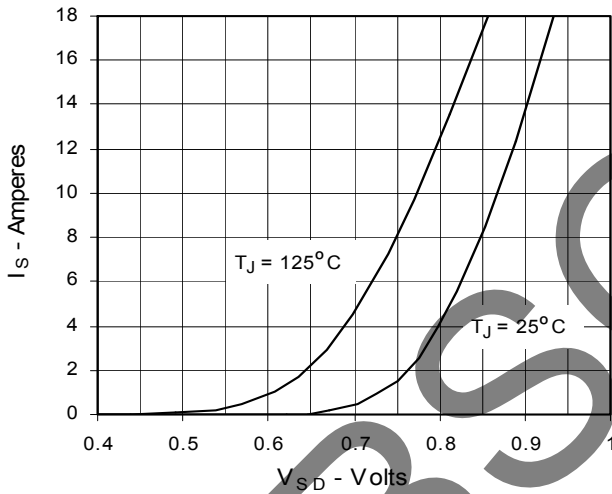
**Fig. 7. Input Admittance**



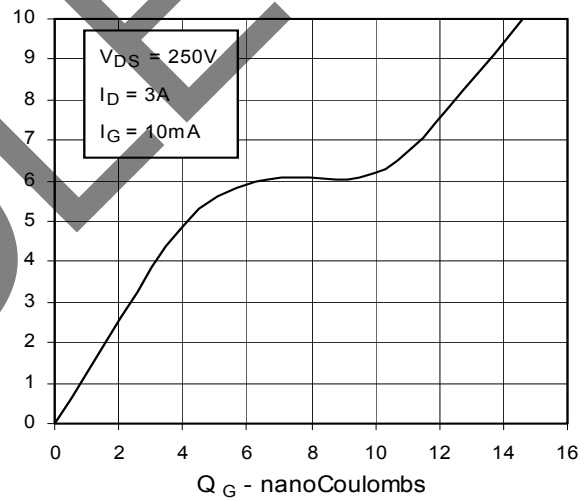
**Fig. 8. Transconductance**



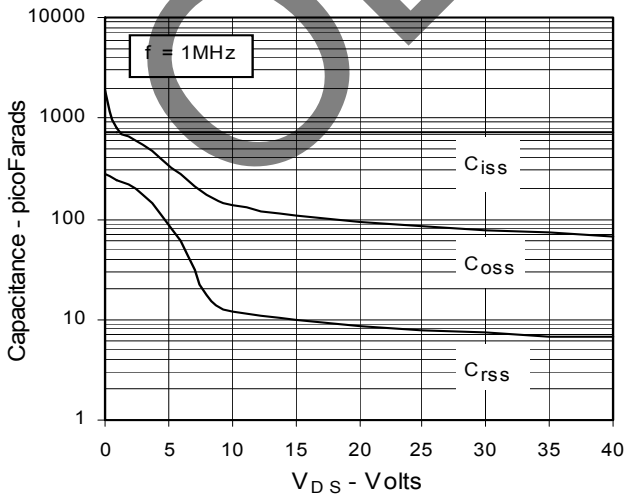
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



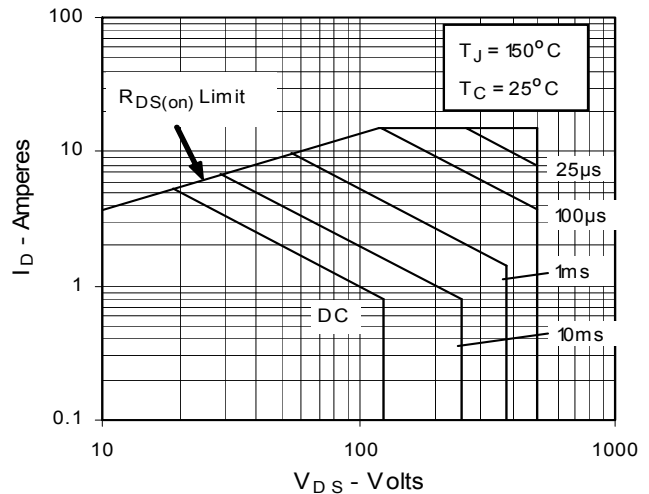
**Fig. 10. Gate Charge**



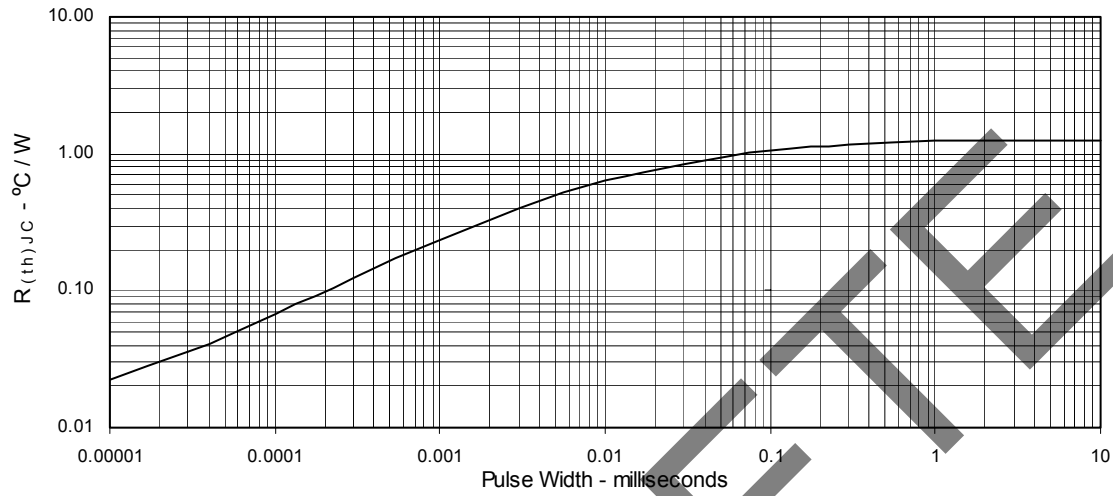
**Fig. 11. Capacitance**



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



**Fig. 13. Maximum Transient Thermal Resistance**



**OBSOLETE**



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