

Polar™ Power MOSFET

IXTA12N50P
IXTI12N50P
IXTP12N50P

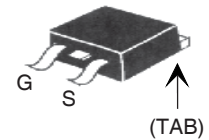
$V_{DSS} = 500V$
 $I_{D25} = 12A$
 $R_{DS(on)} \leq 500m\Omega$

N-Channel Enhancement Mode
 Avalanche Rated

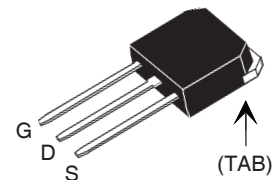


Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	$T_J = 25^\circ C$ to $150^\circ C$	500	V
V_{DGR}	$T_J = 25^\circ C$ to $150^\circ C$, $R_{GS} = 1M\Omega$	500	V
V_{GSS}	Continuous	± 30	V
V_{GSM}	Transient	± 40	V
I_{D25}	$T_C = 25^\circ C$	12	A
I_{DM}	$T_C = 25^\circ C$, pulse width limited by T_{JM}	30	A
I_A	$T_C = 25^\circ C$	12	A
E_{AS}	$T_C = 25^\circ C$	600	mJ
dV/dt	$I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ C$	10	V/ns
P_D	$T_C = 25^\circ C$	200	W
T_J		-55 ... +150	$^\circ C$
T_{JM}		150	$^\circ C$
T_{stg}		-55 ... +150	$^\circ C$
T_L	1.6mm (0.062) from case for 10s	300	$^\circ C$
T_{SOLD}	Plastic body for 10s	260	$^\circ C$
M_d	Mounting torque (TO-220)	1.13 / 10	Nm/lb.in.
M_d	Mounting force (TO-263)	10..65 / 2.2..14.6	N/lb.
Weight	TO-263	2.5	g
	Leaded TO-263	2.8	g
	TO-220	3.0	g

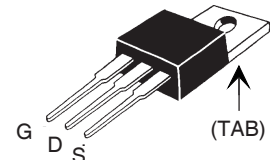
TO-263 (IXTA)



Leaded TO-263 (IXTI)



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

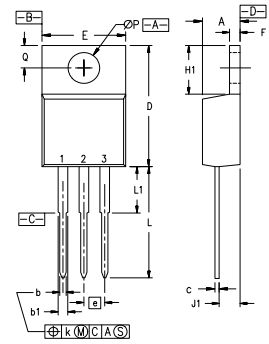
Advantages

- Easy to mount
- Space savings
- High power density

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
BV_{DSS}	$V_{GS} = 0V$, $I_D = 250\mu A$	500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\mu A$	3.0		5.5 V
I_{GSS}	$V_{GS} = \pm 30V$, $V_{DS} = 0V$			± 100 nA
I_{DSS}	$V_{DS} = V_{DSS}$ $V_{GS} = 0V$ $T_J = 125^\circ C$			5 μA 250 μA
$R_{DS(on)}$	$V_{GS} = 10V$, $I_D = 0.5 \cdot I_{D25}$, Note 1			500 m Ω

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	7.5	13	S
C_{iss} C_{oss} C_{rss}	$V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$		1830	pF
			182	pF
			16	pF
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Resistive Switching Times $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ $R_G = 10\Omega$ (External)		22	ns
			27	ns
			65	ns
			20	ns
$Q_{g(on)}$ Q_{gs} Q_{gd}	$V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$		29	nC
			11	nC
			10	nC
R_{thJC} R_{thCS}	(TO-220)	0.50	0.62 $^\circ\text{C/W}$	$^\circ\text{C/W}$

TO-220 (IXTP) Outline



Pins: 1 - Gate 2 - 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

Source-Drain Diode

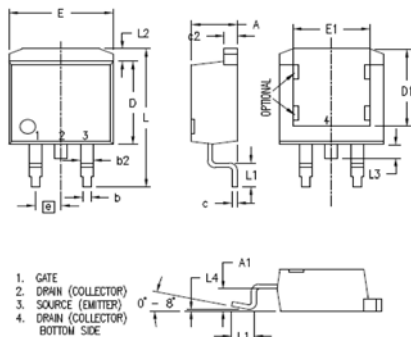
Characteristic Values

($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Test Conditions	Min.	Typ.	Max.
I_S	$V_{GS} = 0\text{V}$			12 A
I_{SM}	Repetitive, pulse width limited by T_{JM}			48 A
V_{SD}	$I_F = I_S$, $V_{GS} = 0\text{V}$, Note 1			1.5 V
t_{rr} Q_{RM} I_{RM}	$I_F = 6\text{A}$, $-di/dt = 150\text{A}/\mu\text{s}$, $V_R = 100\text{V}$, $V_{GS} = 0\text{V}$		2.8	300 ns
			18.2	μC
				A

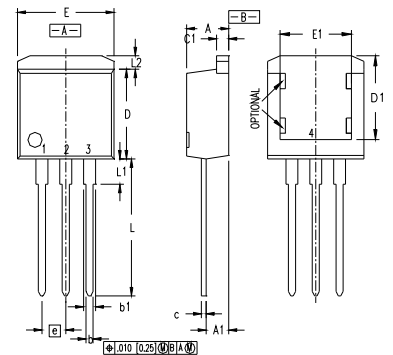
Note 1: Pulse test, $t \leq 300\mu\text{s}$; duty cycle, $d \leq 2\%$.

TO-263 (IXTA) Outline



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

Leaded 263 (IXTI) Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.160	.190	4.06	4.83
A1	.080	.110	2.03	2.79
b	.025	.039	0.51	0.99
b2	.025	.039	1.14	1.40
c	.018	.029	0.46	0.74
c2	.018	.029	1.14	1.40
D	.340	.380	8.64	9.65
D1	.315	.350	8.00	8.89
E	.380	.405	9.65	10.29
E1	.245	.320	6.22	8.13
e	.100 BSC		2.54 BSC	
L	.500	.580	14.61	15.88
L1	.080	.130	2.29	2.79
L2	.040	.055	1.02	1.40

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-262 AA.

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	7,157,338 B2
	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	

Fig. 1. Output Characteristics
@ 25°C

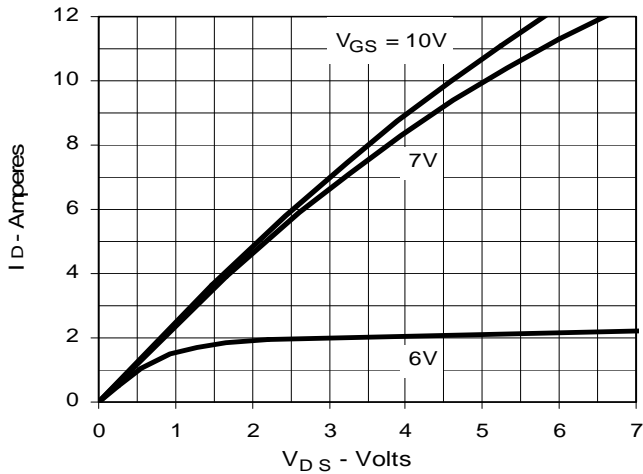


Fig. 2. Extended Output Characteristics
@ 25°C

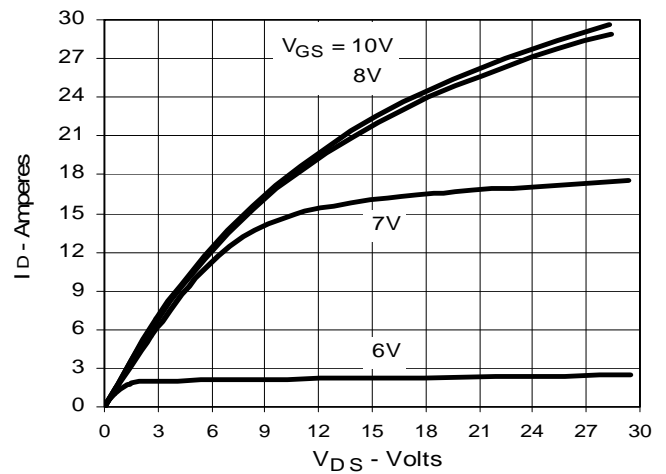


Fig. 3. Output Characteristics
@ 125°C

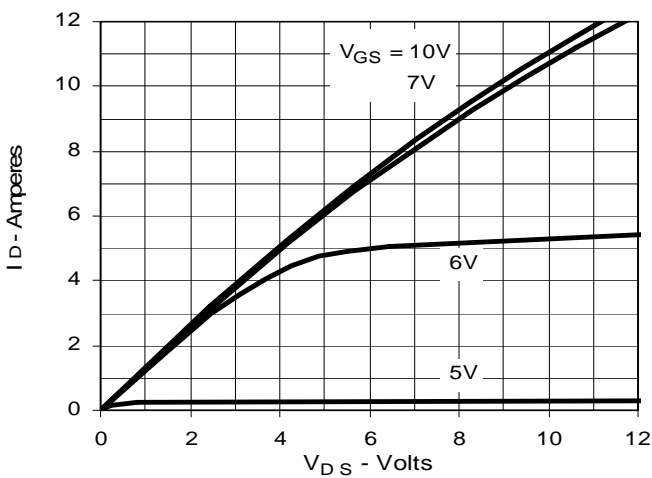


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 6A$ Value vs. Junction Temperature

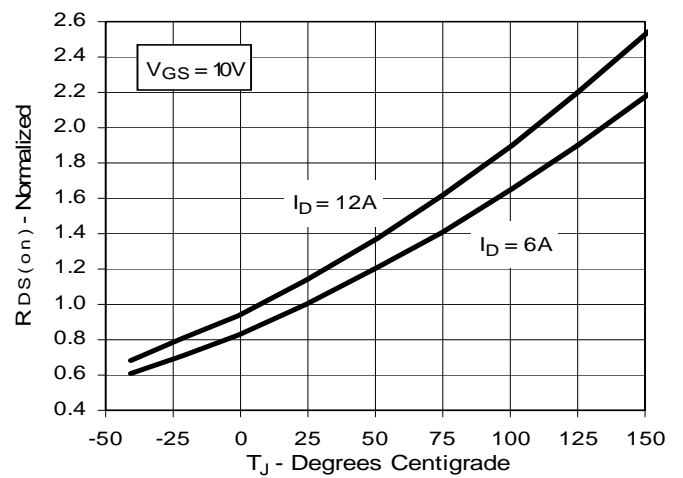


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 6A$ Value vs. Drain Current

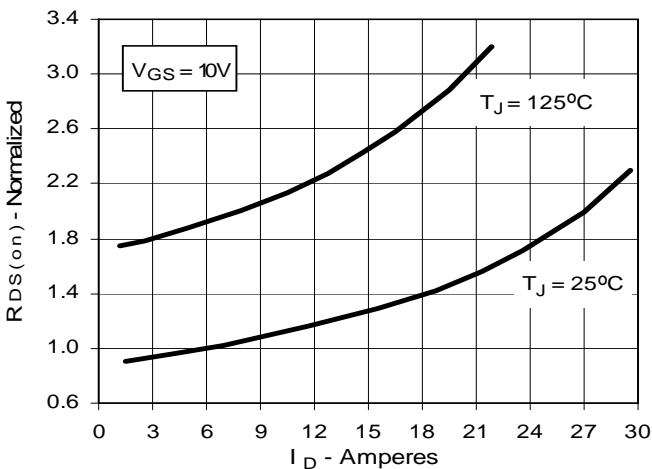


Fig. 6. Drain Current vs. Case Temperature

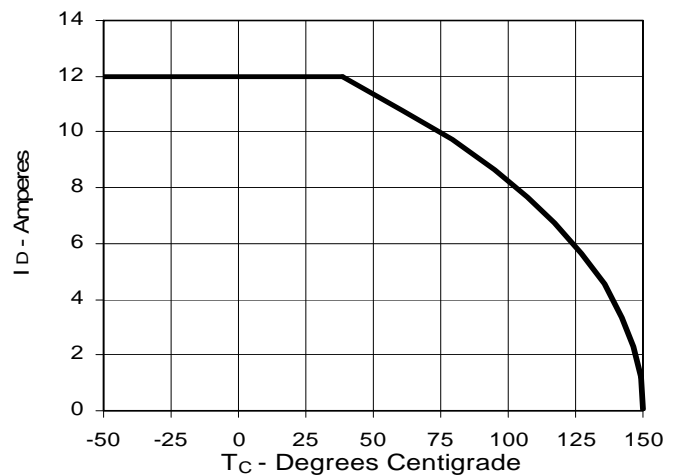


Fig. 7. Input Admittance

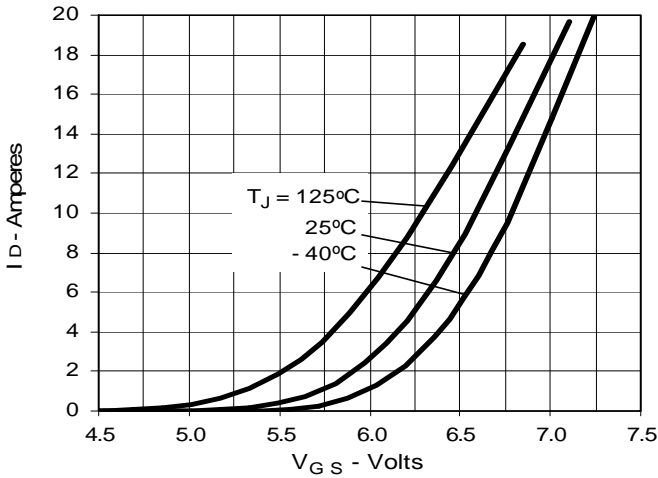


Fig. 8. Transconductance

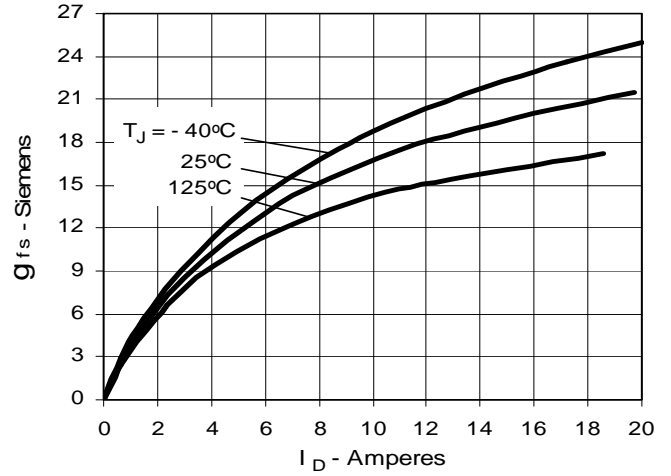


Fig. 9. Source Current vs. Source-To-Drain Voltage

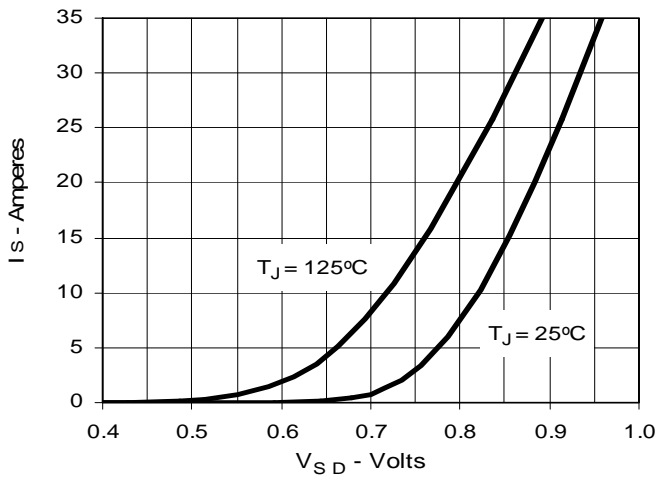


Fig. 10. Gate Charge

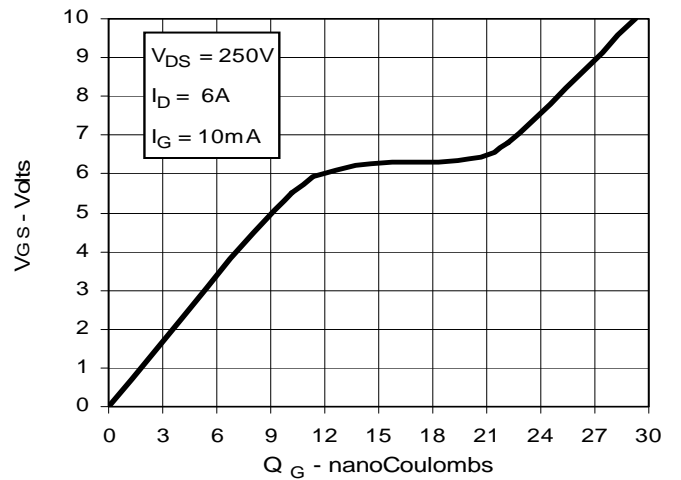


Fig. 11. Capacitance

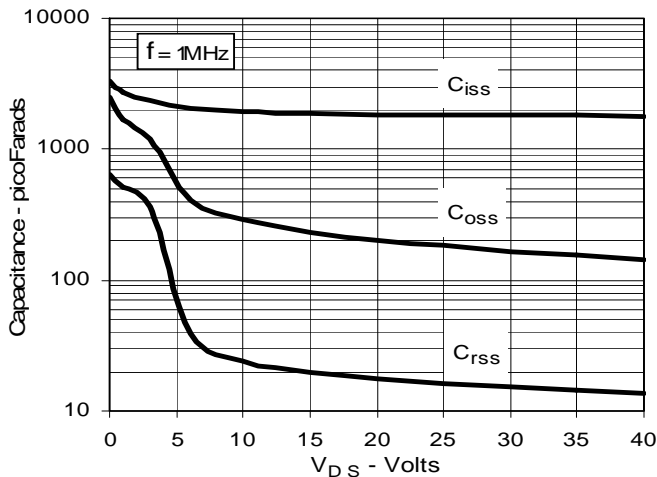


Fig. 12. Forward-Bias Safe Operating Area

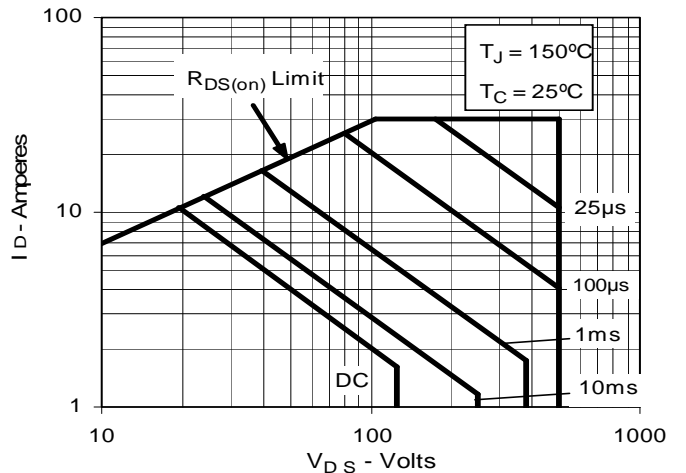


Fig. 13. Maximum Transient Thermal Impedance

