

# PolarHV™ Power MOSFET

**IXTA 10N60P**  
**IXTI 10N60P**  
**IXTP 10N60P**

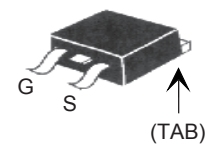
**V<sub>DSS</sub> = 600 V**  
**I<sub>D25</sub> = 10 A**  
**R<sub>DS(on)</sub> ≤ 740 mΩ**

N-Channel Enhancement Mode  
Avalanche Rated

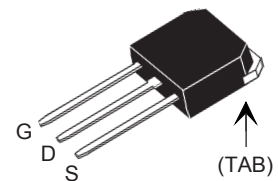


Symbol	Test Conditions	Maximum Ratings	
V <sub>DSS</sub>	T <sub>J</sub> = 25° C to 175° C	600	V
V <sub>DGR</sub>	T <sub>J</sub> = 25° C to 175° C; R <sub>GS</sub> = 1 MΩ	600	V
V <sub>GS</sub>	Continuous Transient	±30	V
I <sub>D25</sub>	T <sub>C</sub> = 25° C	10	A
I <sub>DM</sub>	T <sub>C</sub> = 25° C, pulse width limited by T <sub>JM</sub>	30	A
I <sub>AR</sub>	T <sub>C</sub> = 25° C	10	A
E <sub>AR</sub>	T <sub>C</sub> = 25° C	20	mJ
E <sub>AS</sub>	T <sub>C</sub> = 25° C	500	mJ
dv/dt	I <sub>S</sub> ≤ I <sub>DM</sub> , di/dt ≤ 100 A/μs, V <sub>DD</sub> ≤ V <sub>DSS</sub> , T <sub>J</sub> ≤ 150° C, R <sub>G</sub> = 10 Ω	10	V/ns
P <sub>D</sub>	T <sub>C</sub> = 25° C	200	W
T <sub>J</sub>		-55 ... +150	°C
T <sub>JM</sub>		150	°C
T <sub>stg</sub>		-55 ... +150	°C
T <sub>L</sub>	1.6 mm (0.062 in.) from case for 10 s	300	°C
T <sub>SOLD</sub>	Plastic body for 10 s	260	°C
M <sub>d</sub>	Mounting torque (TO-220)	1.13/10	Nm/lb.in.
F <sub>c</sub>	Mounting force (Leaded TO-263)	10..65 / 2.5..15	N/lb.
Weight	TO-220	4	g
	TO-263 types	3	g

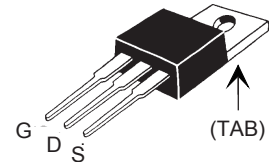
TO-263 (IXTA)



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

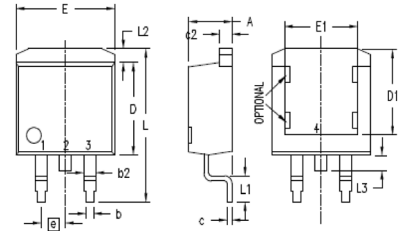
## Advantages

- † Easy to mount
- † Space savings
- † High power density

Symbol	Test Conditions (T <sub>J</sub> = 25° C, unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
BV <sub>DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	600		V
V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 100 μA	3.0		5.0 V
I <sub>GSS</sub>	V <sub>GS</sub> = ±30 V <sub>DC</sub> , V <sub>DS</sub> = 0			±100 nA
I <sub>DSS</sub>	V <sub>DS</sub> = V <sub>DSS</sub>			5 μA
	V <sub>GS</sub> = 0 V      T <sub>J</sub> = 125° C			50 μA
R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.5 I <sub>D25</sub> Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %			740 mΩ

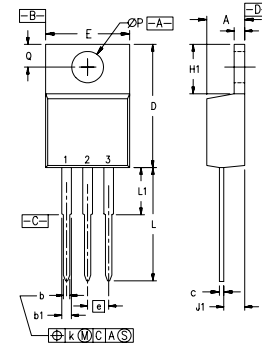
Symbol	Test Conditions	Characteristic Values		
		$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$		
		Min.	Typ.	Max.
$g_{fs}$	$V_{DS} = 10\text{ V}; I_D = 0.5 I_{D25}$ , pulse test	6	11	S
$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		1610	pF
$C_{oss}$			165	pF
$C_{rss}$			14	pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$ $R_G = 10\ \Omega$ (External)		20	ns
$t_r$			24	ns
$t_{d(off)}$			55	ns
$t_f$			18	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$		32	nC
$Q_{gs}$			11	nC
$Q_{gd}$			10	nC
$R_{thJC}$				0.62° C/W
$R_{thCS}$	(TO-220)	0.25		° C/W
	(Leaded TO-263)	0.21		° C/W

Symbol	Test Conditions	Characteristic Values		
		$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$		
		Min.	Typ.	Max.
$I_s$	$V_{GS} = 0\text{ V}$			10 A
$I_{SM}$	Repetitive			30 A
$V_{SD}$	$I_F = I_s, V_{GS} = 0\text{ V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$			1.5 V
$t_{rr}$	$I_F = 9\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}$ $V_R = 100\text{ V}$		500	ns

**TO-263 (IXTA) Outline**


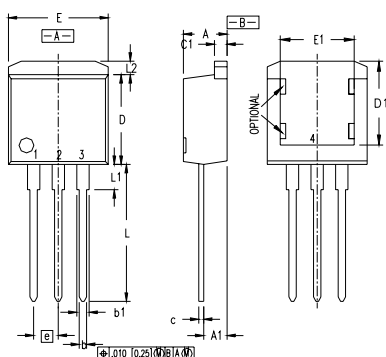
- GATE
  - DRAIN (COLLECTOR)
  - SOURCE (EMITTER)
  - DRAIN (COLLECTOR)
- BOTTOM SIDE

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
L2	.139	.161	3.53	4.08
Q	.100	.125	2.54	3.18

**Leaded 263 (IXTI) Outline**


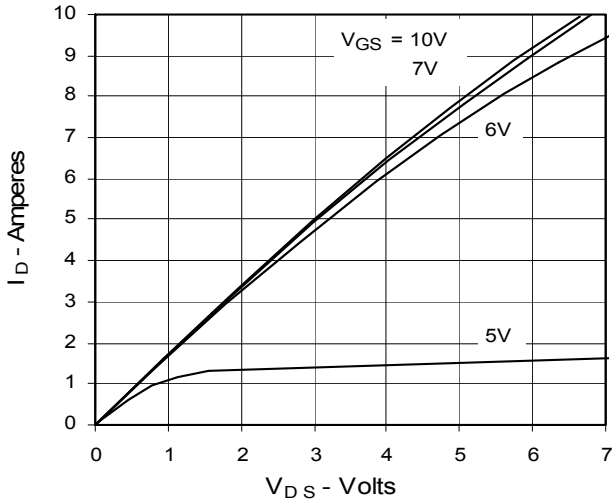
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.160	.190	4.06	4.83
A1	.080	.110	2.03	2.79
b	.025	.039	0.51	0.99
b2	.025	.039	1.14	1.40
c	.018	.029	0.46	0.74
c2	.018	.029	1.14	1.40
D	.340	.380	8.64	9.65
D1	.315	.350	8.00	8.89
E	.380	.405	9.65	10.29
E1	.245	.320	6.22	8.13
e	.100 BSC		2.54 BSC	
L	.500	.580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

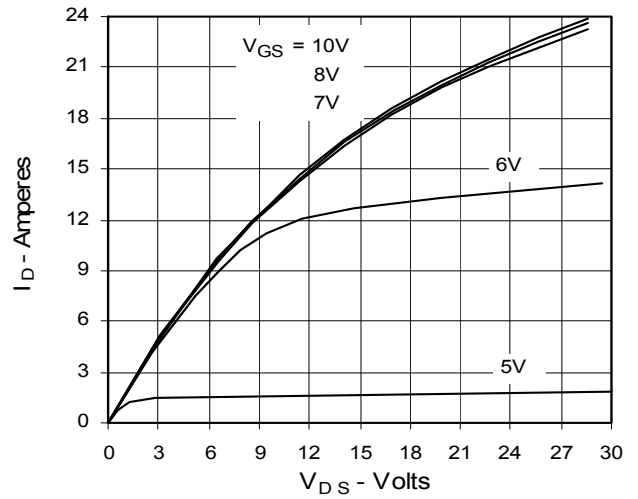
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by 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  
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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 6,771,478 B2

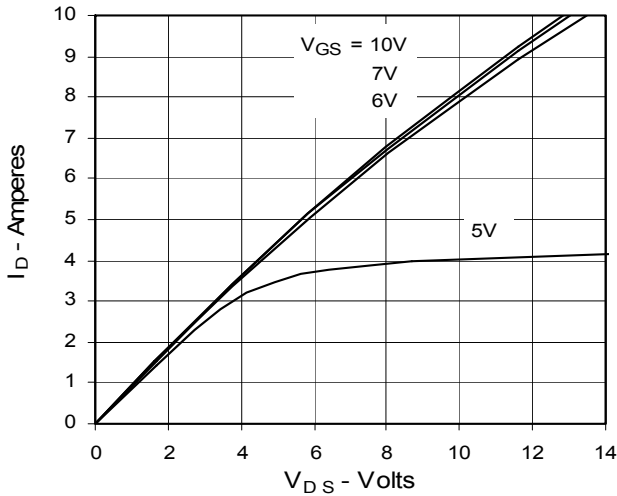
**Fig. 1. Output Characteristics**  
@ 25°C



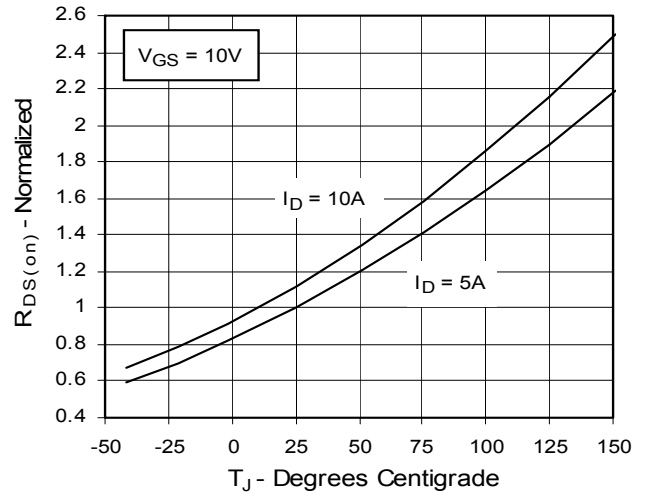
**Fig. 2. Extended Output Characteristics**  
@ 25°C



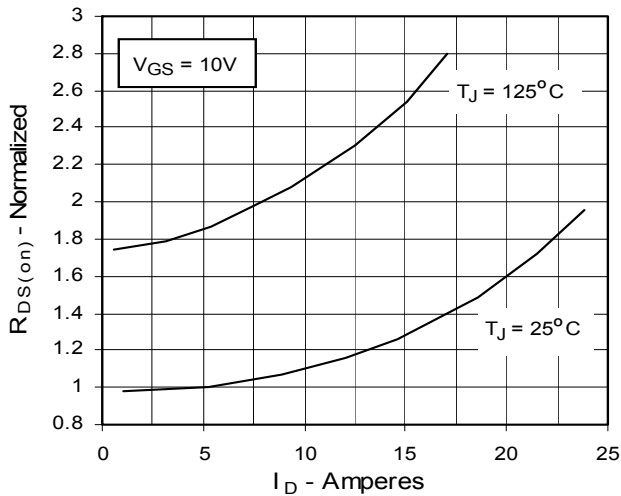
**Fig. 3. Output Characteristics**  
@ 125°C



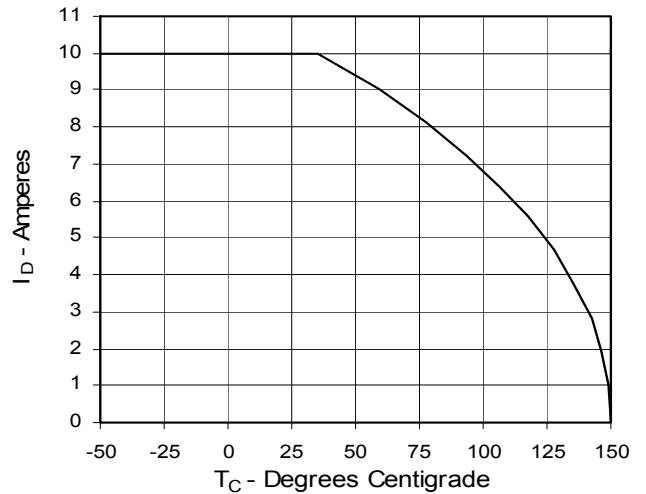
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Junction Temperature**



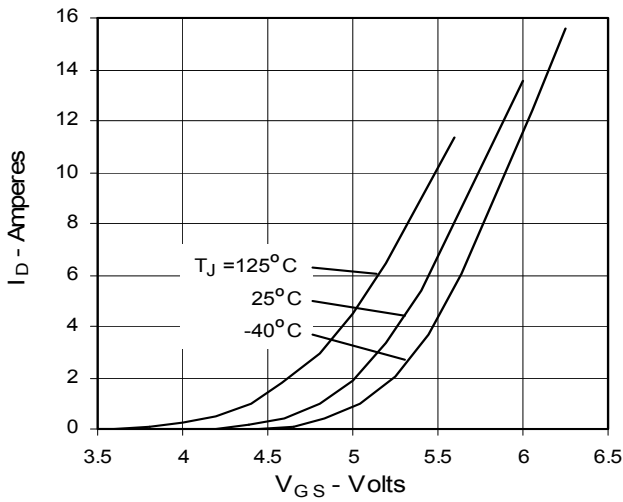
**Fig. 5.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs.  $I_D$**



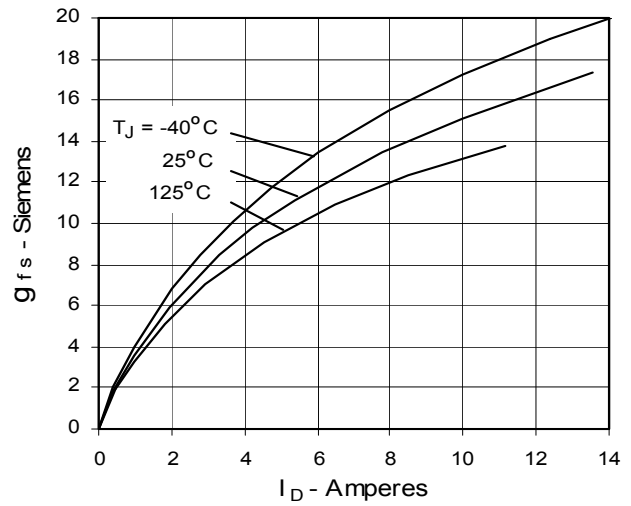
**Fig. 6. Drain Current vs. Case Temperature**



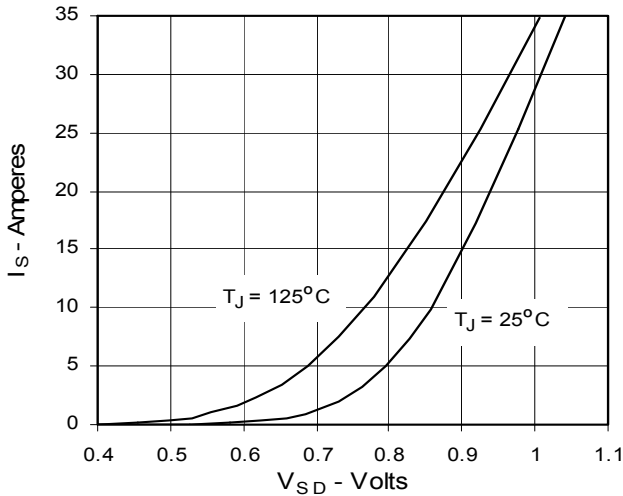
**Fig. 7. Input Admittance**



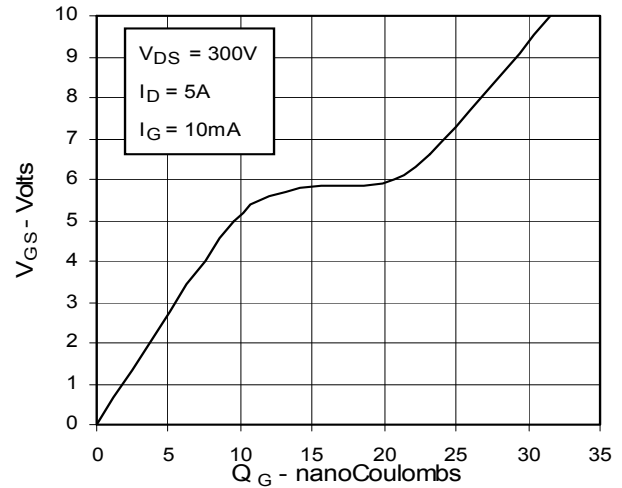
**Fig. 8. Transconductance**



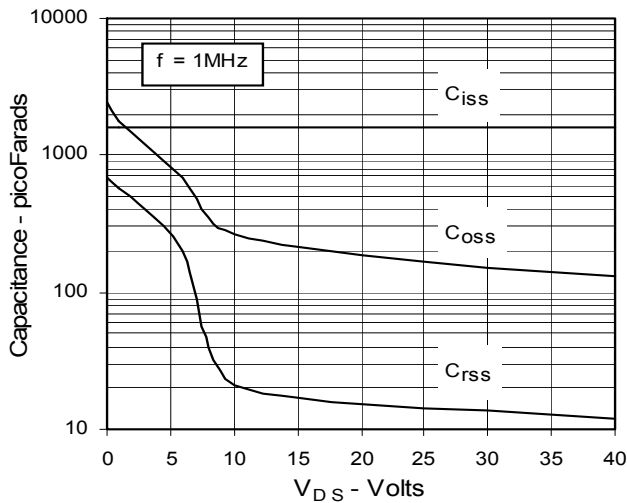
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Maximum Transient Thermal Resistance**

