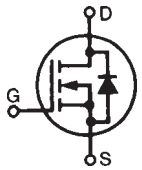
PolarHV™ Power MOSFET

IXFA 12N50P
IXFP 12N50P

V_{DSS} = 500 V
I_{D25} = 12 A
$R_{DS(on)}$ ≤ 0.5 Ω
t_{rr} ≤ 200 ns

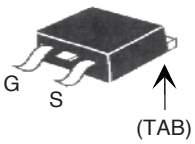
N-Channel Enhancement Mode
Avalanche Rated



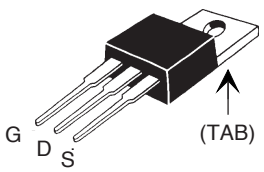
Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	500	V
V_{DGR}	T_J = 25°C to 150°C; R_{GS} = 1 MΩ	500	V
V_{GSM}	Transient	± 40	V
V_{GSM}	Continuous	± 30	V
I_{D25}	T_C = 25°C	12	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}	20	A
I_{AR}	T_C = 25°C	12	A
E_{AR}	T_C = 25°C	24	mJ
E_{AS}	T_C = 25°C	600	mJ
dv/dt	$I_S \le I_{DM}$, di/dt ≤ 100 A/μs, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$, R_G = 10 Ω	20	V/ns
P_D	T_C = 25°C	200	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	1.6 mm (0.062 in.) from case for 10 s	300	°C
	Plastic body for 10 seconds	260	°C
M_d	Mounting torque (TO-220)	1.13/10	Nm/lb.in.
Weight	TO-220	4	g
	TO-263	3	g

Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
V_{DSS}	V_{GS} = 0 V, I_D = 250 μA	500			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 1 mA	3.0		5.5	V
I_{GSS}	V_{GS} = ± 30 V_{DC}, V_{DS} = 0			±100	nA
I_{DSS}	$V_{DS} = V_{DSS}$			5	μA
	V_{GS} = 0 V, T_J = 125°C			150	μA
$R_{DS(on)}$	V_{GS} = 10 V, $I_D = 0.5\ I_{D25}$, Note 1			500	mΩ

TO-263 (IXFA)



TO-220 (IXFP)



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

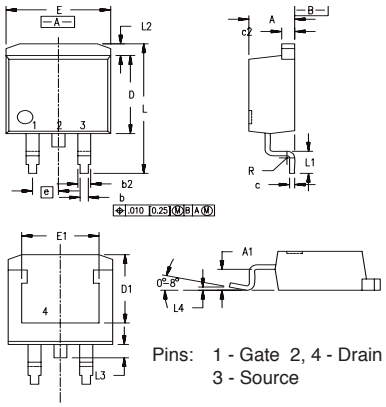
Symbol	Test Conditions (T$_J$ = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS}= 20 V; I_D = 0.5 I_{D25}, Note 1		13		S
C_{iss}			1690		pF
C_{oss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		182		pF
C_{rss}			16		pF
$t_{d(on)}$			22		ns
t_r	V_{GS} = 10 V, V_{DS} = 0.5 V_{DSS}, I_D = I_{D25}		27		ns
$t_{d(off)}$	R_G = 50 Ω (External)		65		ns
t_f			20		ns
$Q_{g(on)}$			29		nC
Q_{gs}	V_{GS}= 10 V, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}		11		nC
Q_{gd}			10		nC
R_{thJC}				0.62	K/W
R_{thCK}	(TO-220)		0.25		KW

Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
I_S	V_{GS} = 0 V			44	A
I_{SM}	Repetitive			132	A
V_{SD}	I_F = I_S, V_{GS} = 0 V, Note 1			1.5	V
t_{rr}	I_F = 22 A, -di/dt = 100 A/µs			200	ns
Q_{RM}	V_R = 100 V, V_{GS} = 0 V		0.4		µC
I_{RM}			4f		A

Note 1: Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %

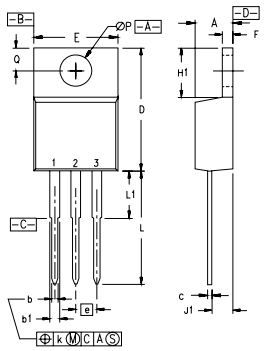
TO-263 (IXTA) Outline



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

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.06	4.83	.160	.190
A1	2.03	2.79	.080	.110
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.46	0.74	.018	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	7.11	8.13	.280	.320
E	9.65	10.29	.380	.405
E1	6.86	8.13	.270	.320
e	2.54	BSC	.100	BSC
L	14.61	15.88	.575	.625
L1	2.29	2.79	.090	.110
L2	1.02	1.40	.040	.055
L3	1.27	1.78	.050	.070
L4	0	0.38	0	.015
R	0.46	0.74	.018	.029

TO-220 (IXTP) Outline



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

SYM	INCHES MIN	MAX	MILLIMETERS 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.

Fig. 1. Output Characteristics @ 25°C

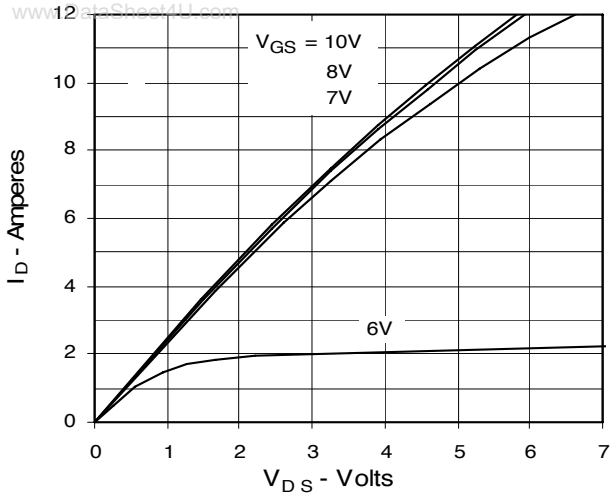


Fig. 2. Extended Output Characteristics @ 25°C

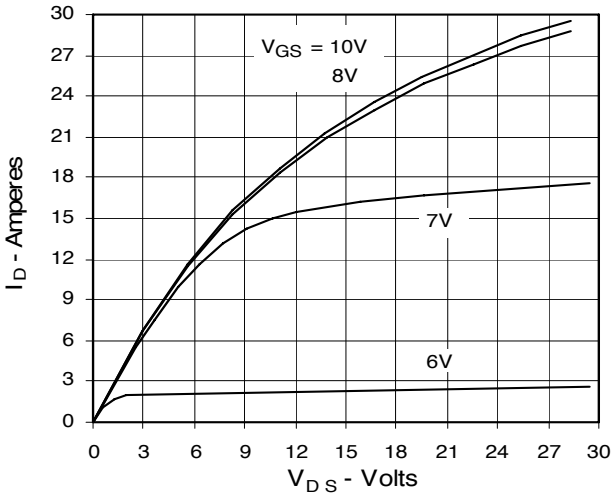


Fig. 3. Output Characteristics @ 125°C

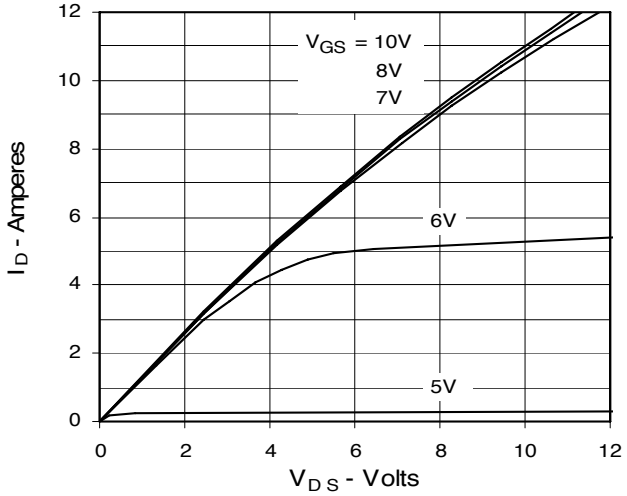


Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. Junction Temperature

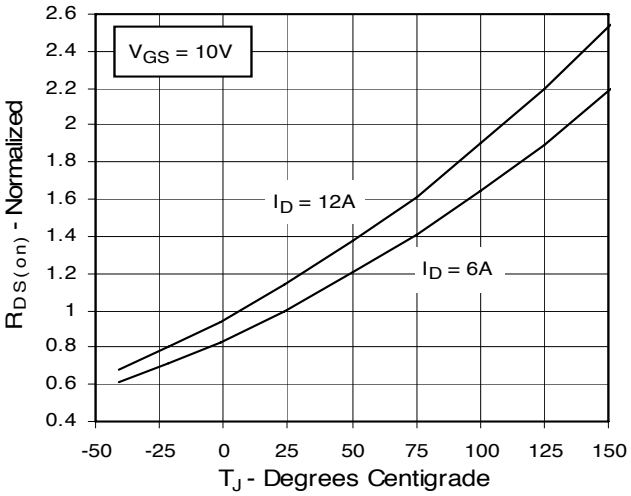


Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. I_D

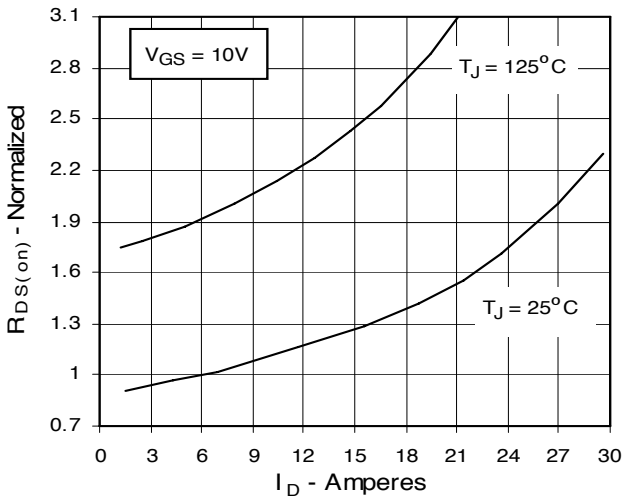


Fig. 6. Drain Current vs. Case Temperature

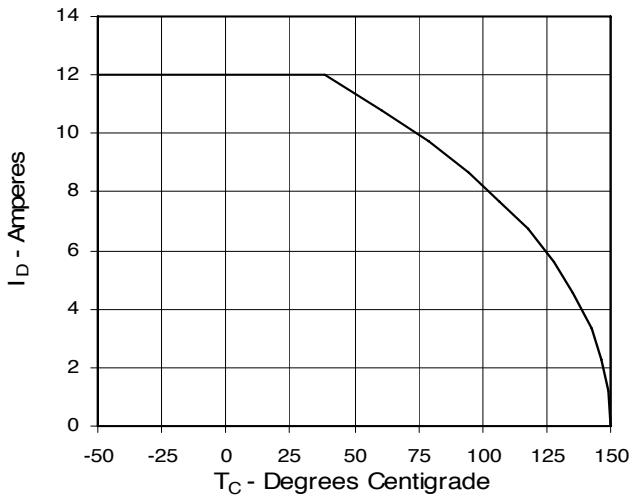


Fig. 7. Input Admittance

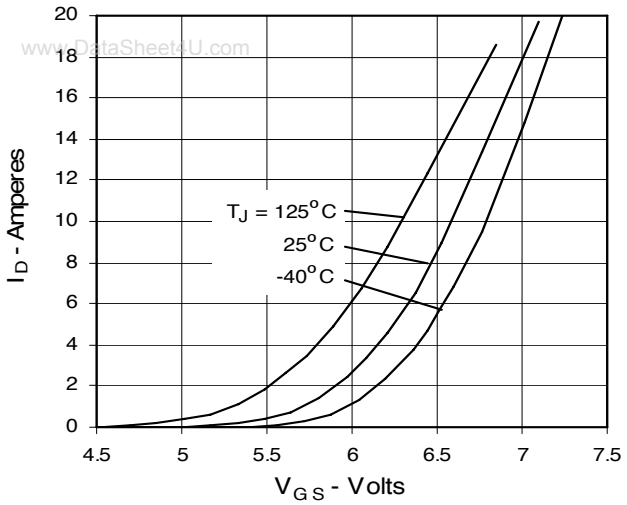


Fig. 8. Transconductance

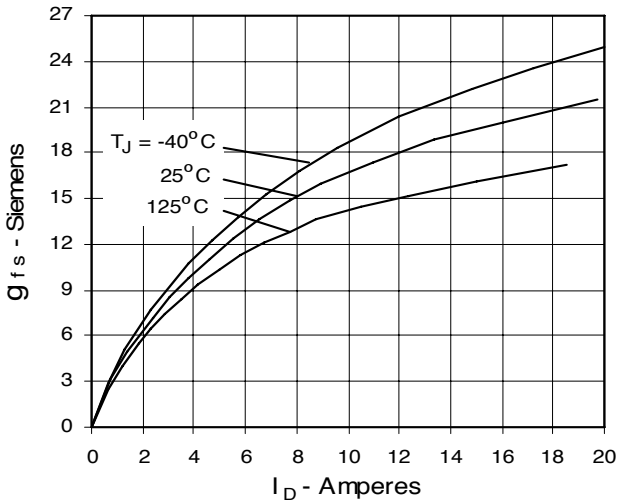


Fig. 9. Source Current vs. Source-To-Drain Voltage

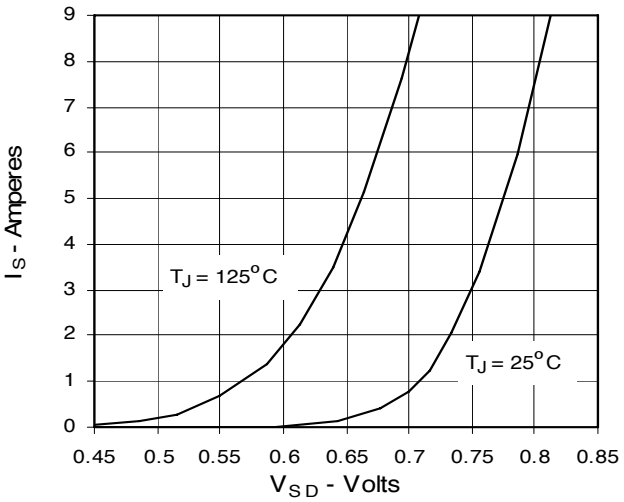


Fig. 10. Gate Charge

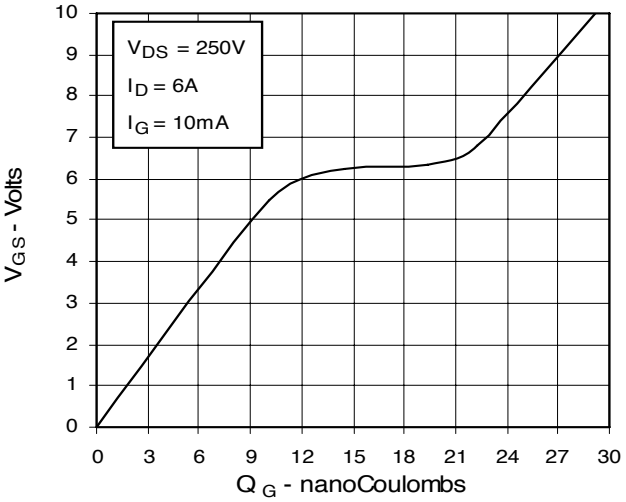


Fig. 11. Capacitance

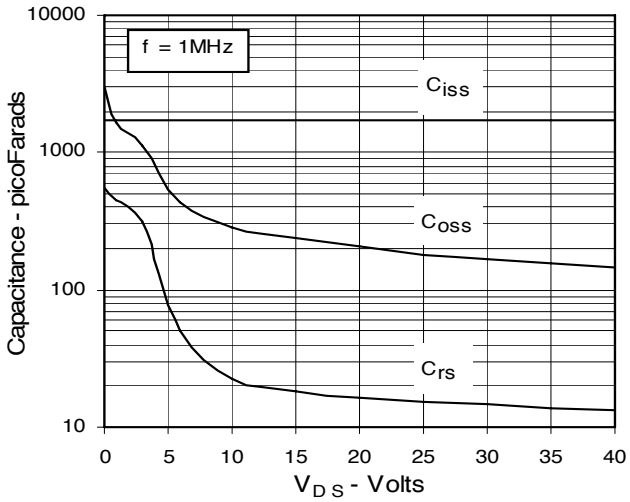


Fig. 12. Forward-Bias Safe Operating Area

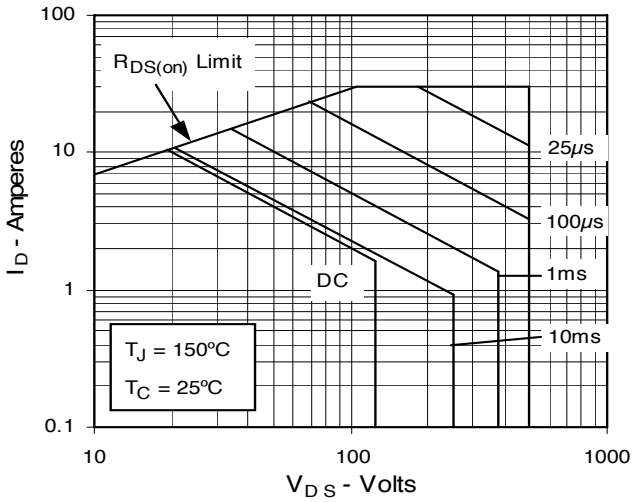


Fig. 13. Maximum Transient Thermal Resistance