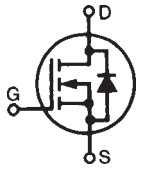
IXYS

High Voltage Power MOSFET

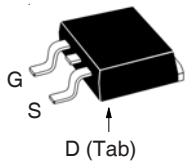
IXTA3N120
IXTP3N120
IXTH3N120

V_{DSS} = 1200V
I_{D25} = 3A
$R_{DS(on)}$ ≤ 4.5Ω

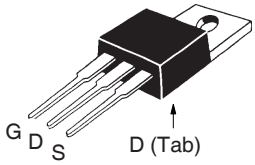
N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode



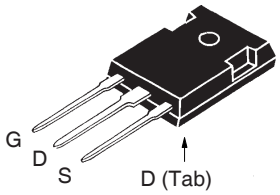
TO-263 AA (IXTA)



TO-220AB (IXTP)



TO-247 (IXTH)



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

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	1200	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	1200	V
V_{GSS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_C = 25°C	3	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	12	A
I_A	T_C = 25°C	3	A
E_{AS}	T_C = 25°C	700	mJ
dv/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$	5	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	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
F_C	Mounting Force (TO-263)	10..65 / 2.2..14.6	N/lb
M_d	Mounting Torque (TO-247 & TO-220)	1.13 / 10	Nm/lb.in
Weight	TO-263	2.5	g
	TO-220	3.0	g
	TO-247	6.0	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 1mA	1200			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250μA	2.5		5.0	V
I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
I_{DSS}	$V_{DS} = V_{DSS}$, V_{GS} = 0V			25	μA
	T_J = 125°C			1	mA
$R_{DS(on)}$	V_{GS} = 10V, $I_D = 0.5 \bullet I_{D25}$, Note 1			4.5	Ω

Features

- International Standard Packages
- High Voltage Package
- Fast Intrinsic Diode
- Avalanche Rated
- Molding Epoxies meet UL 94 V-0 Flammability Classification
- High Blocking Voltage

Advantages

- Easy to Mount
- Space Savings
- High Power Density

Applications

- High Voltage Power Supplies
- Capacitor Discharge Applications
- Pulse Circuits

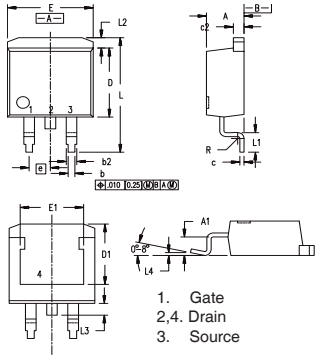
Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max	
g_{fs}	V_{DS} = 20V, I_D = 0.5 • I_{D25}, Note 1	1.5	2.6		S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		1100	1350	pF
C_{oss}			110	135	pF
C_{rss}			40	60	pF
$t_{d(on)}$	**Resistive Switching Times**		17		ns
t_r	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		15		ns
$t_{d(off)}$	R_G = 4.7Ω (External)		32		ns
t_f			18		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		42		nC
Q_{gs}			8		nC
Q_{gd}			21		nC
R_{thJC}				0.62	°C/W
R_{thCS}	TO-220		0.50		°C/W
R_{thCS}	TO-247		0.21		°C/W

Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max	
I_S	V_{GS} = 0V			3	A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			12	A
V_{SD}	I_F = I_S, V_{GS} = 0V, Note 1			1.5	V
t_{rr}	I_F = 3A, V_{GS} = 0V,-di/dt = 100A/μs V_R = 100V		700		ns

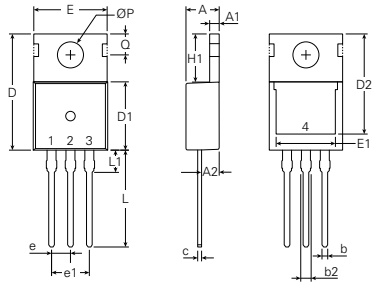
Note 1: Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

TO-263 Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.06	4.83	.160	.190
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.40	0.74	.016	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	8.00	8.89	.280	.320
E	9.65	10.41	.380	.405
E1	6.22	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	0.13	0	.005

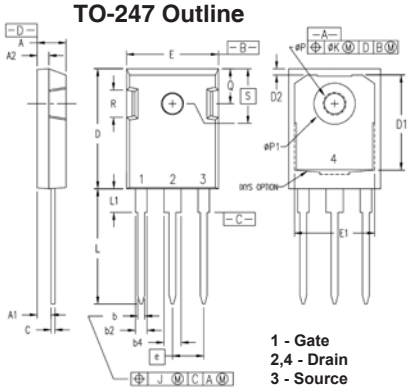
TO-220 Outline



1 - Gate
2,4 - Drain
3 - Source

Symbol	Inches Min.	Typical	Max.	Millimeters Min.	Typical	Max
A	0.169	–	0.185	4.30	–	4.70
A1	0.047	–	0.055	1.20	–	1.40
A2	0.079	–	0.106	2.00	–	2.70
b	0.024	–	0.039	0.60	–	1.00
b2	0.045	–	0.057	1.15	–	1.45
c	0.014	–	0.026	0.35	–	0.65
D	0.587	–	0.626	14.90	–	15.90
D1	0.335	–	0.370	8.50	–	9.40
(D2)	0.500	–	0.531	12.70	–	13.50
E	0.382	–	0.406	9.70	–	10.30
(E1)	0.283	–	0.323	7.20	–	8.20
e	0.100 BSC			2.45 BSC		
e1	0.200 BSC			5.08 BSC		
H1	0.244	–	0.268	6.20	–	6.80
L	0.492	–	0.547	12.50	–	13.90
L1	0.110	–	0.154	2.80	–	3.90
ØP	0.134	–	0.150	3.40	–	3.80
Q	0.106	–	0.126	2.70	–	3.20

TO-247 Outline



1 - Gate
2,4 - Drain
3 - Source

Dim.	Millimeter min	max	Inches min	max
A	4.70	5.30	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	0.99	1.40	0.039	0.055
b2	1.65	2.39	0.065	0.094
b4	2.59	3.43	0.102	0.135
c	0.38	0.89	0.015	0.035
D	20.79	21.45	0.819	0.845
D1	13.07	-	0.515	-
D2	0.51	1.35	0.020	0.053
E	15.48	16.24	0.610	0.640
E1	13.45	-	0.53	-
E2	4.31	5.48	0.170	0.216
e	5.45 BSC		0.215 BSC	
L	19.80	20.30	0.078	0.800
L1	-	4.49	-	0.177
Ø P	3.55	3.65	0.140	0.144
Ø P1	-	7.39	-	0.290
Q	5.38	6.19	0.212	0.244
S	6.14 BSC		0.242 BSC	

Fig. 1. Output Characteristics @ T_J = 25ºC

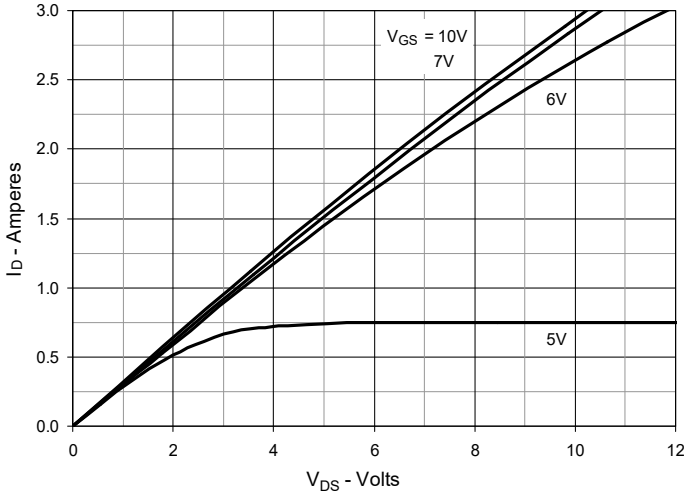


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

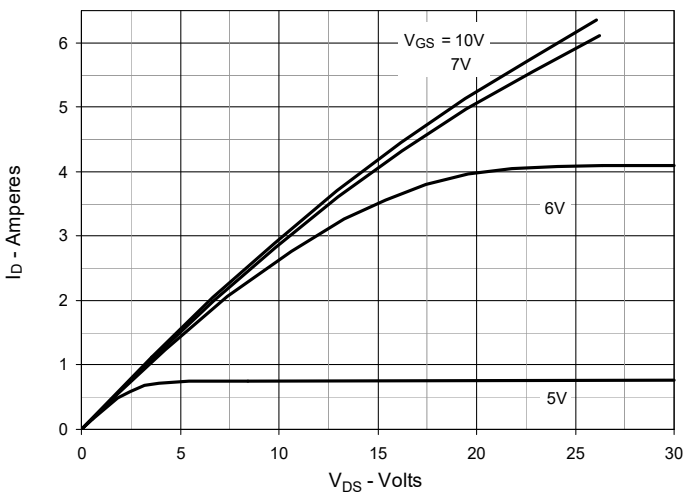


Fig. 3. Output Characteristics @ T_J = 125ºC

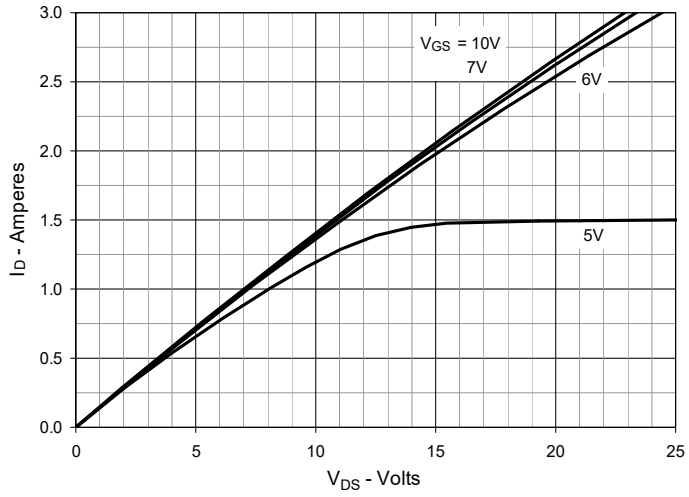


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 1.5A Value vs. Junction Temperature

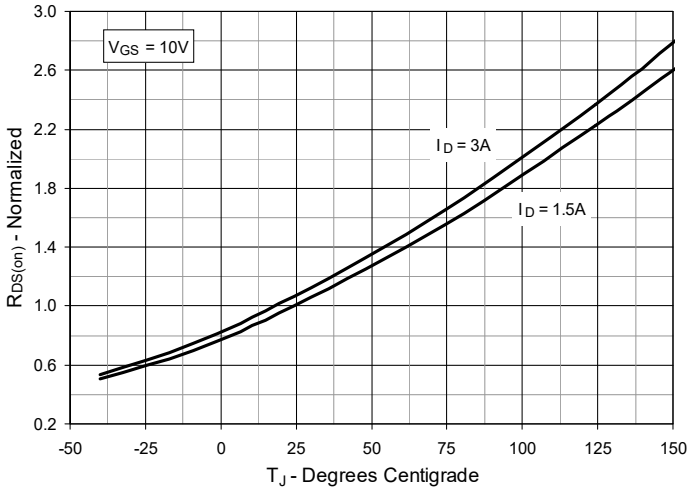


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 1.5A Value vs. Drain Current

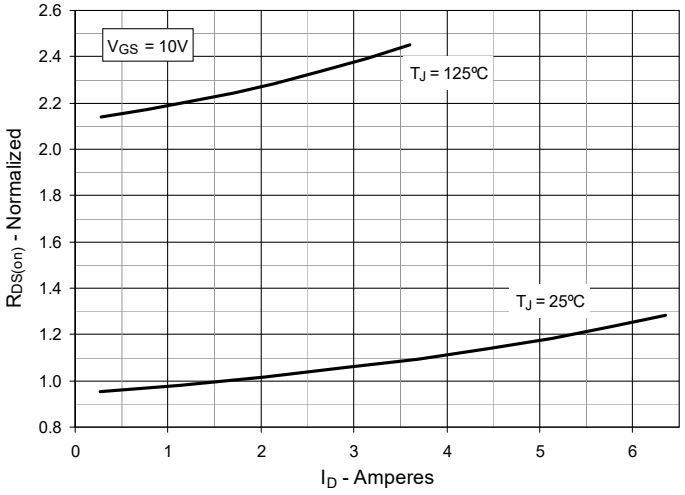


Fig. 6. Maximum Drain Current vs. Case Temperature

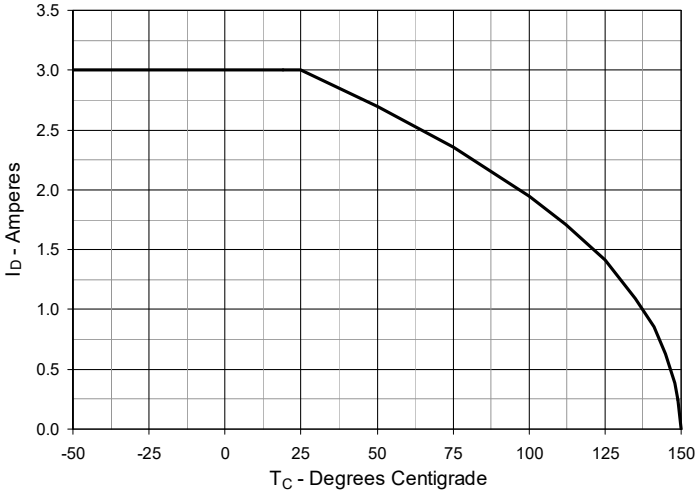


Fig. 7. Input Admittance

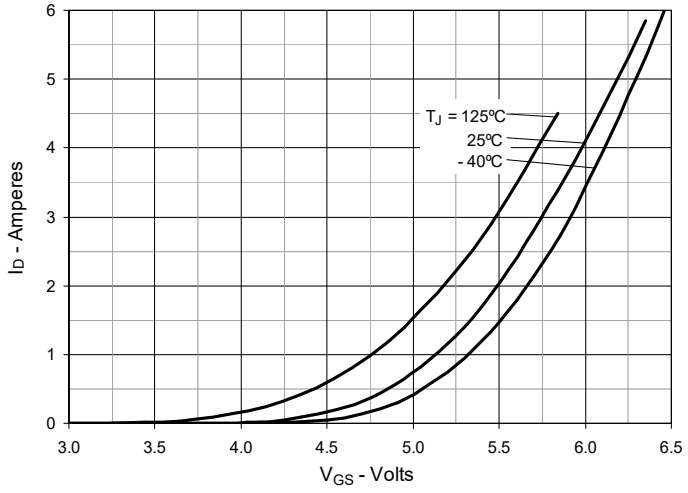


Fig. 8. Transconductance

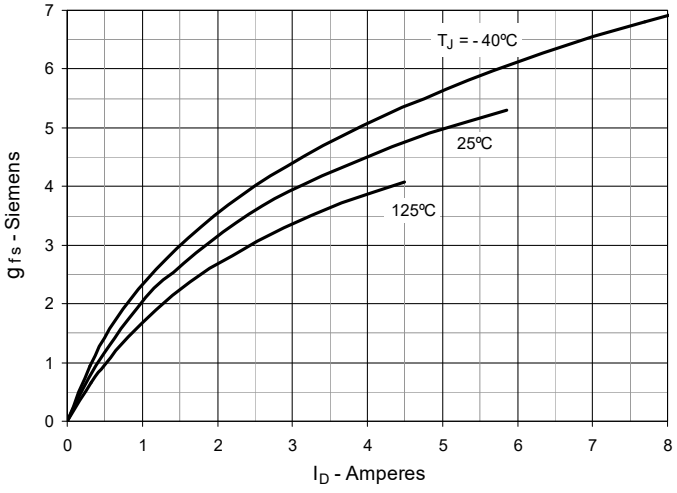


Fig. 9. Forward Voltage Drop of Intrinsic Diode

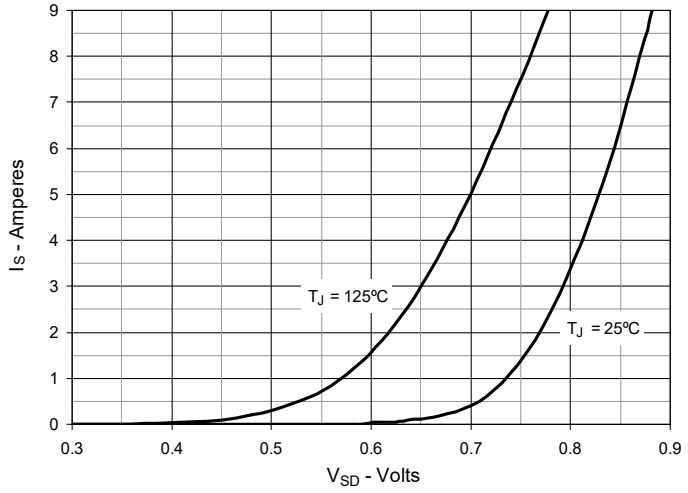


Fig. 10. Gate Charge

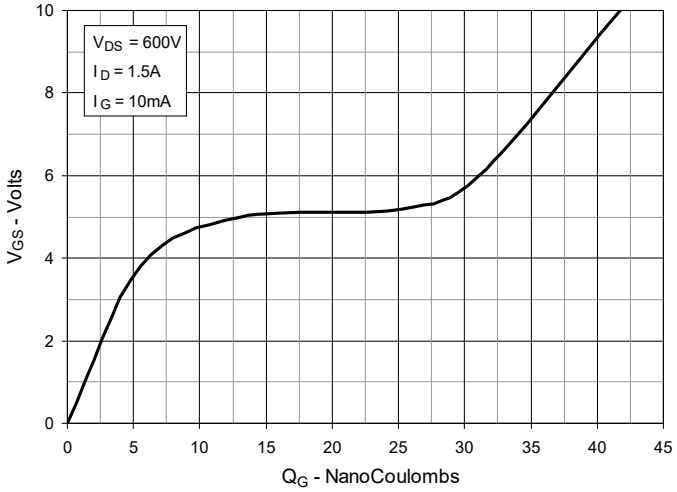


Fig. 11. Capacitance

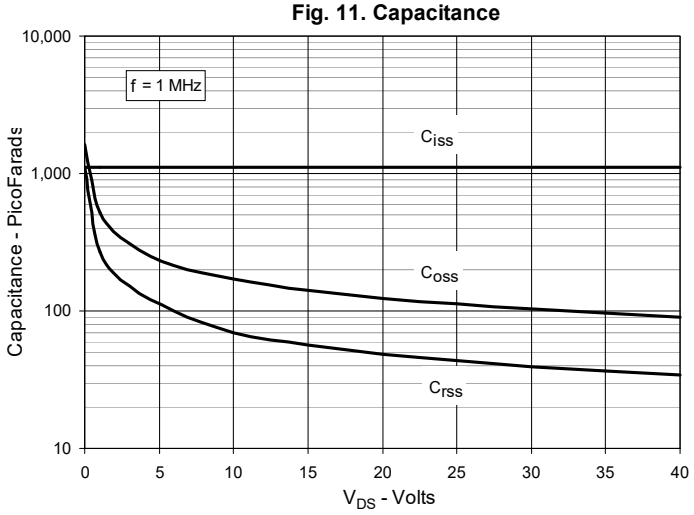


Fig.12. Forward-Bias Safe Operating Area

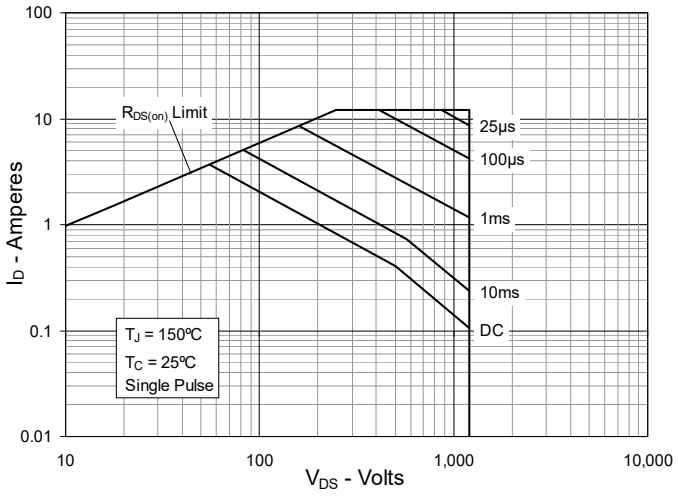


Fig. 13. Maximum Transient Thermal Impedance