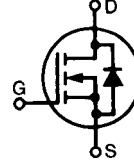


# High Voltage Power MOSFETs

**IXTA/IXTP 3N120**  
**IXTA/IXTP 3N110**

N-Channel Enhancement Mode  
Avalanche Rated, High dv/dt

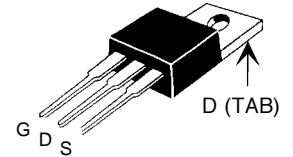
Preliminary Data Sheet



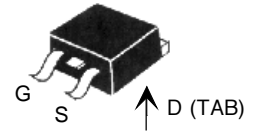
$V_{DSS}$	$I_{D25}$	$R_{DS(on)}$
1200 V	3 A	4.5 $\Omega$
1100 V	3 A	4.0 $\Omega$

Symbol	Test Conditions	Maximum Ratings		
$V_{DSS}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	3N120	1200	V
		3N110	1100	V
$V_{DGR}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$	3N120	1200	V
		3N110	1100	V
$V_{GS}$	Continuous		$\pm 20$	V
$V_{GSM}$	Transient		$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$		3	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$		12	A
$I_{AR}$	$T_C = 25^\circ\text{C}$		3	A
$E_{AR}$	$T_C = 25^\circ\text{C}$		20	mJ
$E_{AS}$			700	mJ
$dv/dt$	$I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$		5	V/ns
$P_D$	$T_C = 25^\circ\text{C}$		150	W
$T_J$			-55 to +150	$^\circ\text{C}$
$T_{JM}$			150	$^\circ\text{C}$
$T_{stg}$			-55 to +150	$^\circ\text{C}$
$T_L$	1.6 mm (0.063 in) from case for 10 s		300	$^\circ\text{C}$
$M_d$	Mounting torque (TO-220)		1.13/10	Nm/lb.in.
<b>Weight</b>	TO-220		4	g
	TO-263		2	g

## TO-220 (IXTP)



## TO-263 (IXTA)



G = Gate      D = Drain  
S = Source    TAB = Drain

## Features

- International standard packages
- Low  $R_{DS(on)}$
- Rated for unclamped Inductive load Switching (UIS)
- Molding epoxies meet UL 94 V-0 flammability classification

## Advantages

- Easy to mount
- Space savings
- High power density

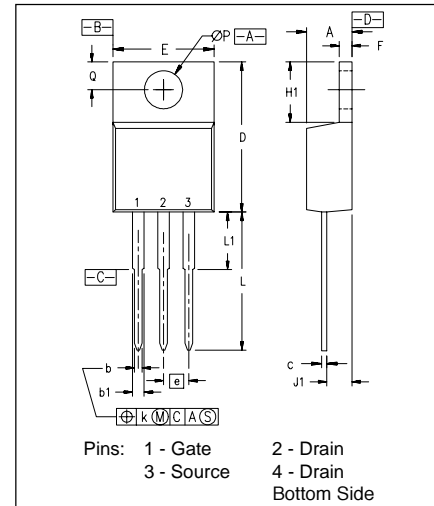
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 1 \text{ mA}$	3N120	1200	V
		3N110	1100	V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$		2.5	4.5 V
$I_{GSS}$	$V_{GS} = \pm 20 V_{DC}$ , $V_{DS} = 0$			$\pm 100 \text{ nA}$
$I_{DSS}$	$V_{DS} = 0.8 V_{DSS}$ , $V_{GS} = 0 \text{ V}$	$T_J = 25^\circ\text{C}$		25 $\mu\text{A}$
		$T_J = 125^\circ\text{C}$		1 mA
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$ Note 1	3N120		4.5 $\Omega$
		3N110		4.0 $\Omega$

Symbol	Test Conditions	Characteristic Values			
		(T <sub>J</sub> = 25°C, unless otherwise specified)			
		min.	typ.	max.	
<b>g<sub>fs</sub></b>	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 0.5 • I <sub>D25</sub> , Note 1	1.5	2.2		S
<b>C<sub>iss</sub></b>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		1050	1300	pF
<b>C<sub>oss</sub></b>			100	125	pF
<b>C<sub>rss</sub></b>			25	50	pF
<b>t<sub>d(on)</sub></b>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 0.5 • I <sub>D25</sub> R <sub>G</sub> = 4.7 Ω (External),		17		ns
<b>t<sub>r</sub></b>			15		ns
<b>t<sub>d(off)</sub></b>			32		ns
<b>t<sub>f</sub></b>			18		ns
<b>Q<sub>g(on)</sub></b>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 0.5 • I <sub>D25</sub>		39		nC
<b>Q<sub>gs</sub></b>			9		nC
<b>Q<sub>gd</sub></b>			22		nC
<b>R<sub>thJC</sub></b>	(TO-220)			0.8	KW
<b>R<sub>thCK</sub></b>			0.25		KW

Symbol	Test Conditions	Characteristic Values			
		(T <sub>J</sub> = 25°C, unless otherwise specified)			
		min.	typ.	max.	
<b>I<sub>S</sub></b>	V <sub>GS</sub> = 0 V			3	A
<b>I<sub>SM</sub></b>	Repetitive; pulse width limited by T <sub>JM</sub>			12	A
<b>V<sub>SD</sub></b>	I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0 V, Note 1			1.5	V
<b>t<sub>rr</sub></b>	I <sub>F</sub> = I <sub>S</sub> , -di/dt = 100 A/μs, V <sub>R</sub> = 100 V		700		ns

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

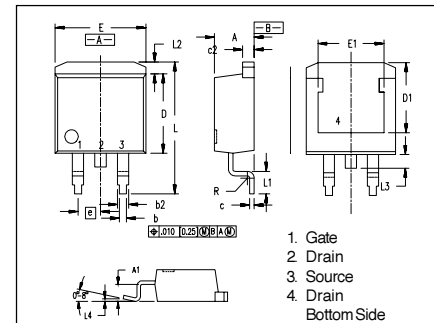
### TO-220 (IXTP) Outline



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

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-220 AB.

### TO-263 (IXTA) Outline



Dim.	Millimeter		Inches	
	Min.	Max.	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

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 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715  
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025

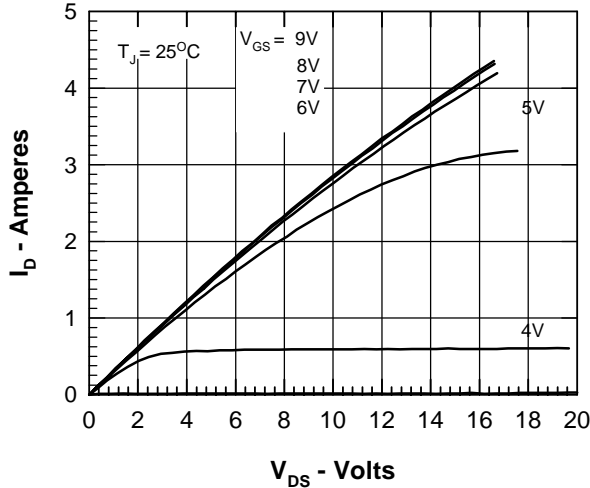


Fig.1 Output Characteristics @  $T_j = 25^\circ\text{C}$

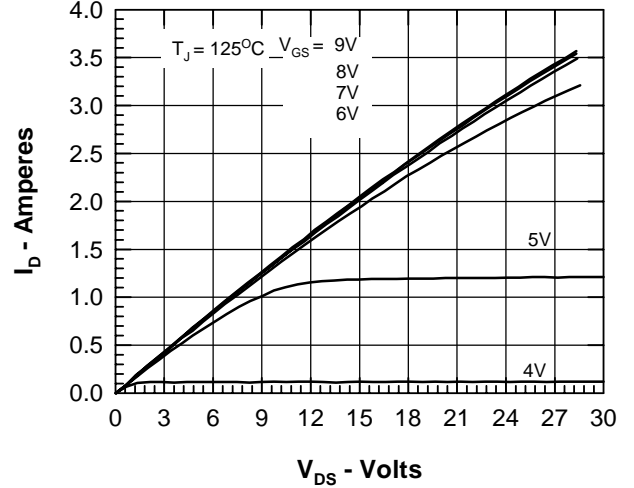


Fig. 2 Output Characteristics @  $T_j = 125^\circ\text{C}$

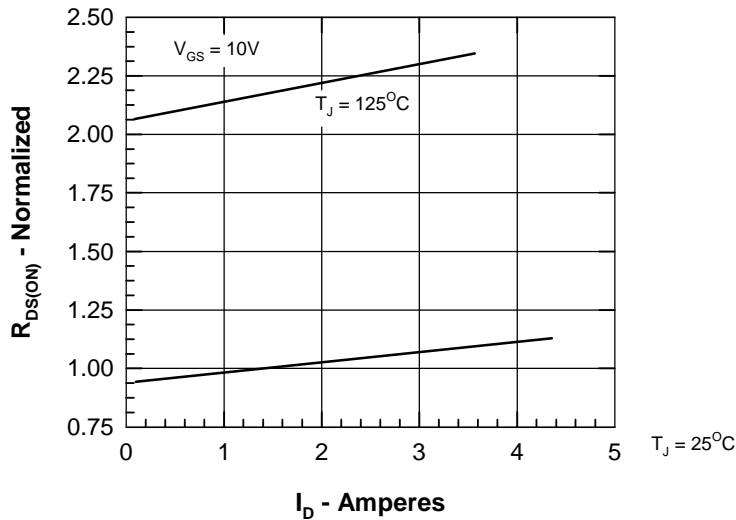


Fig. 3  $R_{DS(on)}$  vs. Drain Current

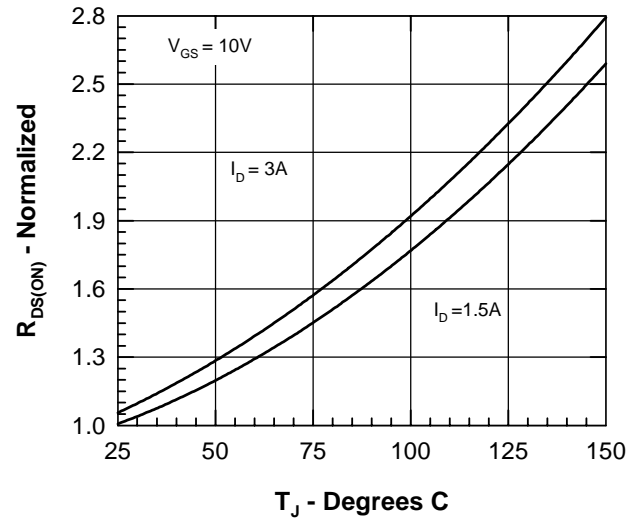


Fig. 4 Temperature Dependence of Drain to Source Resistance

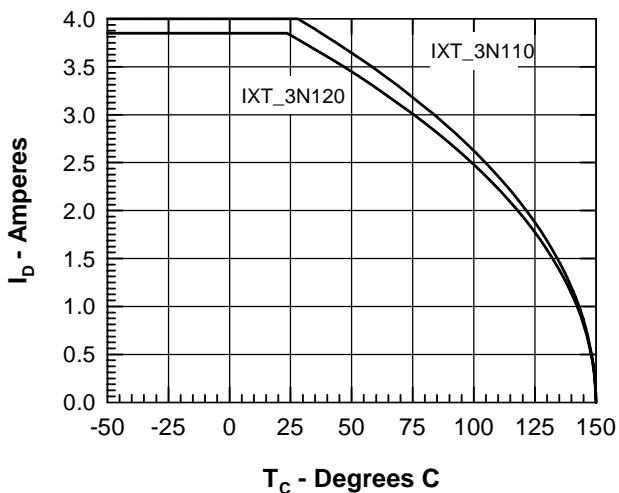


Fig. 5 Drain Current vs. Case Temperature

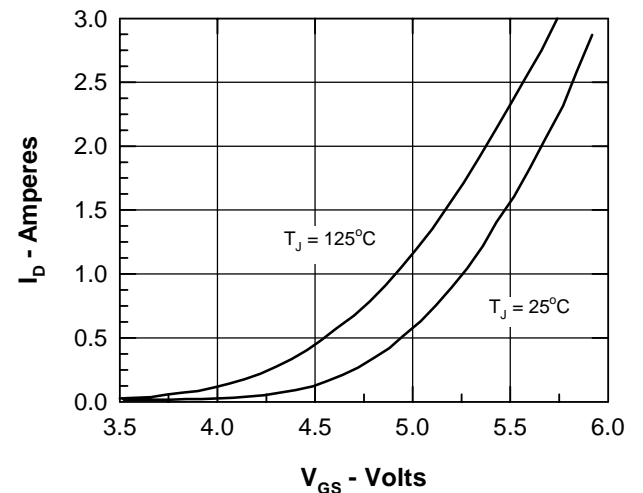


Fig. 6 Drain Current vs. Gate Source Voltage

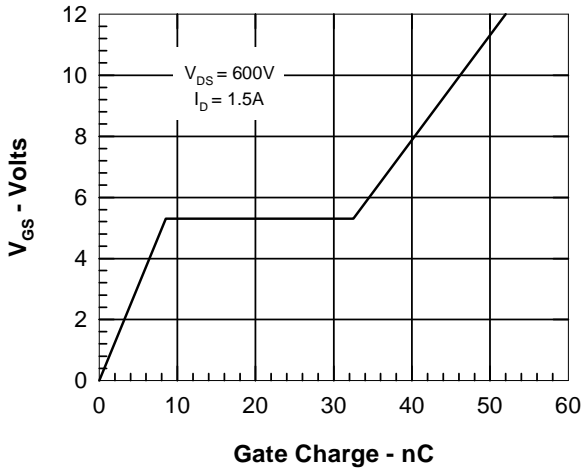


Fig. 7 Gate Charge Characteristic Curve

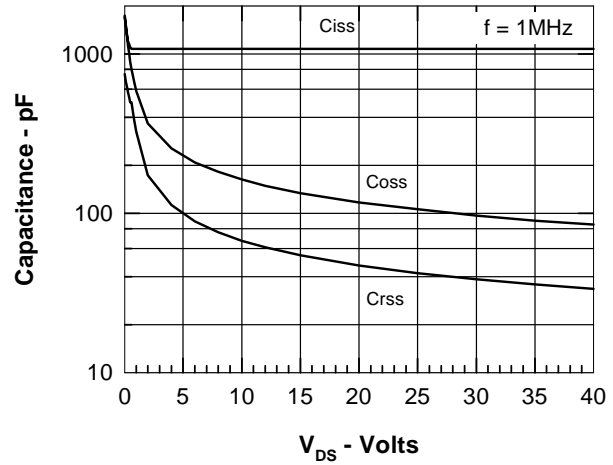


Fig. 8 Capacitance Curves

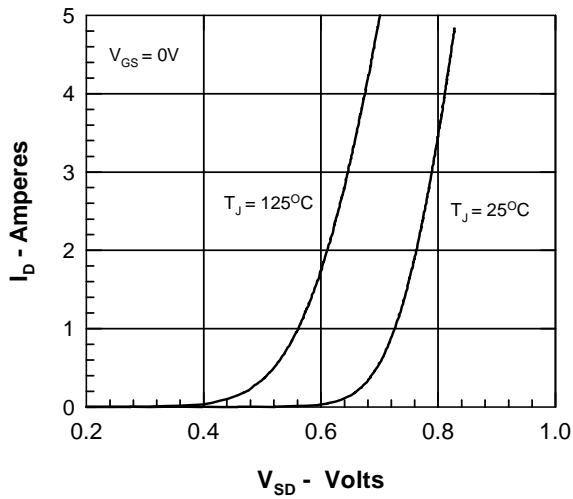


Fig. 9 Drain Current vs Drain to Source Voltage

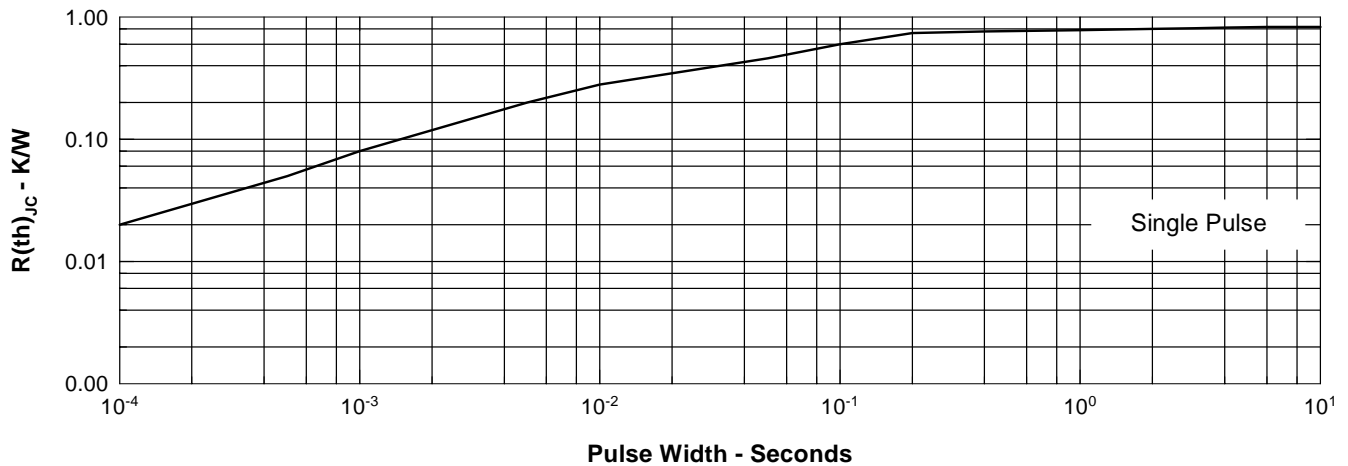


Fig.10 Transient Thermal Impedance

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4,850,072	4,931,844	5,034,796	5,063,307	5,237,481	5,381,025