

# High Voltage Power MOSFET

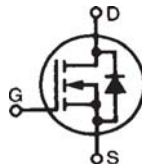
# IXTT3N200P3HV IXTH3N200P3HV

$$V_{DSS} = 2000V$$

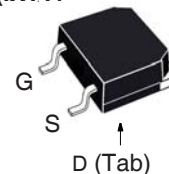
$$I_{D25} = 3A$$

$$R_{DS(on)} \leq 8\Omega$$

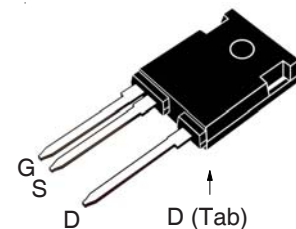
N-Channel Enhancement Mode



TO-268HV (IXTT)



TO-247HV (IXTH)



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

Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	2000	V
$V_{DGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1M\Omega$	2000	V
$V_{GSS}$	Continuous	$\pm 20$	V
$V_{GSM}$	Transient	$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	3.0	A
$I_{D110}$	$T_C = 110^\circ\text{C}$	2.6	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$	9.0	A
$P_D$	$T_C = 25^\circ\text{C}$	520	W
$T_J$		- 55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		- 55 ... +150	$^\circ\text{C}$
$T_L$	Maximum Lead Temperature for Soldering	300	$^\circ\text{C}$
$T_{SOLD}$	Plastic Body for 10s	260	$^\circ\text{C}$
$M_d$	Mounting Torque	1.13/10	Nm/lb.in
Weight	TO-268HV	4	g
	TO-247HV	6	g

## Features

- High Blocking Voltage
- High Voltage Packages

## Advantages

- Easy to Mount
- Space Savings
- High Power Density

## Applications

- High Voltage Power Supplies
- Capacitor Discharge Applications
- Pulse Circuits
- Laser and X-Ray Generation Systems

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0V$ , $I_D = 250\mu\text{A}$	2000		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$	3.0		5.0 V
$I_{GSS}$	$V_{GS} = \pm 20V$ , $V_{DS} = 0V$			$\pm 100$ nA
$I_{DSS}$	$V_{DS} = V_{DSS}$ , $V_{GS} = 0V$ $T_J = 125^\circ\text{C}$			10 $\mu\text{A}$ 250 $\mu\text{A}$
$R_{DS(on)}$	$V_{GS} = 10V$ , $I_D = 1.5A$ , Note 1			8 $\Omega$

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$V_{DS} = 50\text{V}$ , $I_D = 1.5\text{A}$ , Note 1	2.3	3.8	S
$C_{iss}$	$V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$		1860	pF
$C_{oss}$			133	pF
$C_{rss}$			58	pF
$R_{Gi}$	Gate Input Resistance		3.8	$\Omega$
$t_{d(on)}$	<b>Resistive Switching Times</b> $V_{GS} = 10\text{V}$ , $V_{DS} = 500\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ $R_G = 5\Omega$ (External)		21	ns
$t_r$			27	ns
$t_{d(off)}$			67	ns
$t_f$			60	ns
$Q_{g(on)}$	$V_{GS} = 10\text{V}$ , $V_{DS} = 1\text{kV}$ , $I_D = 0.5 \cdot I_{D25}$		70	nC
$Q_{gs}$			8	nC
$Q_{gd}$			39	nC
$R_{thJC}$			0.24	$^\circ\text{C/W}$
$R_{thCS}$	TO-247HV		0.21	$^\circ\text{C/W}$

### Source-Drain Diode

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$I_S$	$V_{GS} = 0\text{V}$			3 A
$I_{SM}$	Repetitive, Pulse Width Limited by $T_{JM}$			12 A
$V_{SD}$	$I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1			1.5 V
$t_{rr}$	$I_F = 1.5\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$ , $V_{GS} = 0\text{V}$		420	ns
$Q_{RM}$			380	nC
$I_{RM}$			1.8	A

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

### ADVANCE TECHNICAL INFORMATION

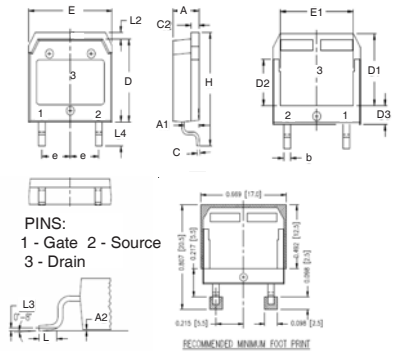
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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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	7,157,338B2
4,860,072	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	

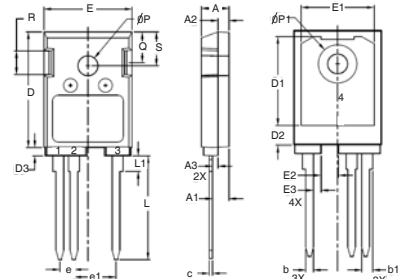
### TO-268HV Outline



PINS:  
1 - Gate 2 - Source  
3 - Drain

SYM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.465	.476	11.80	12.10
D2	.295	.307	7.50	7.80
D3	.114	.126	2.90	3.20
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
E	.215	BSC	5.45	BSC
H	.736	.752	18.70	19.10
L	.067	.079	1.70	2.00
L2	.039	.045	1.00	1.15
L3	.010	BSC	0.25	BSC
L4	.150	.161	3.80	4.10

### TO-247HV Outline



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

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A1	.114	.122	2.90	3.10
A2	.075	.083	1.90	2.10
A3	.035	.043	0.90	1.10
b	.053	.059	1.35	1.50
b1	.075	.083	1.90	2.10
c	.022	.030	0.55	0.75
D	.819	.843	20.80	21.40
D1	.638	.646	16.20	16.40
D2	.134	.146	3.40	3.70
D3	.055	.063	1.40	1.60
E	.622	.638	15.80	16.20
E1	.520	.528	13.20	13.40
E2	.118	.126	3.00	3.20
E3	.051	.059	1.30	1.50
e	.100	BSC	2.54	BSC
e1	.300	BSC	7.62	BSC
L	.732	.748	18.60	19.00
L1	.106	.118	2.70	3.00
øP	.138	.142	3.50	3.60
øP1	.272	.280	6.90	7.10
Q	.216	.224	5.50	5.70
R	.165	.169	4.20	4.30
S	.240	.248	6.10	6.30

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

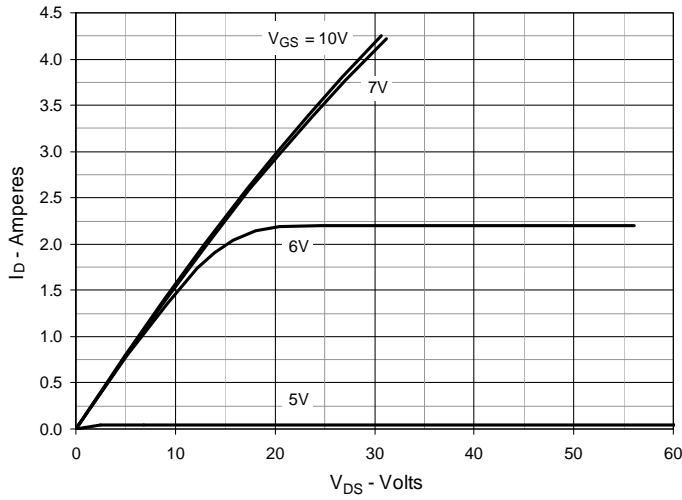


Fig. 2. Output Characteristics @  $T_J = 125^\circ\text{C}$

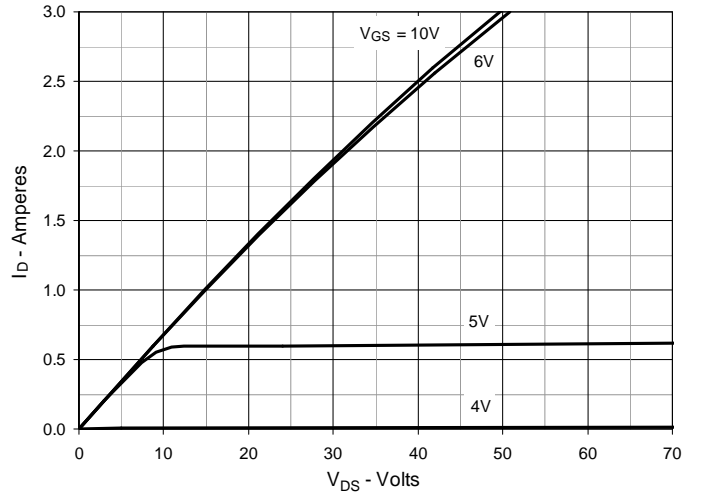


Fig. 3.  $R_{DS(on)}$  Normalized to  $I_D = 1.5\text{A}$  Value vs. Junction Temperature

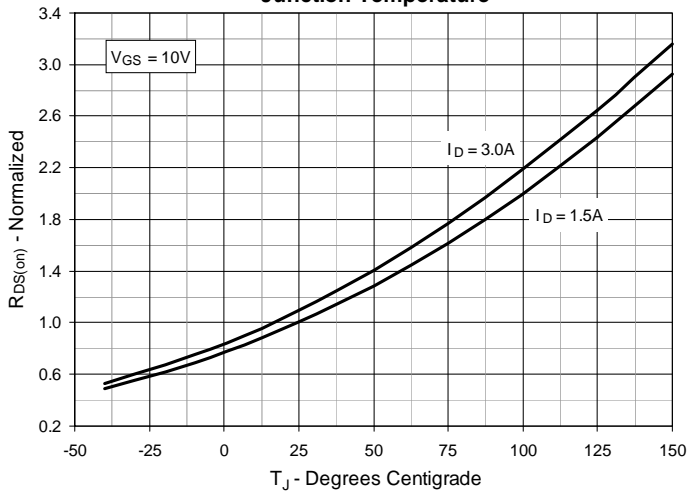


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 1.5\text{A}$  Value vs. Drain Current

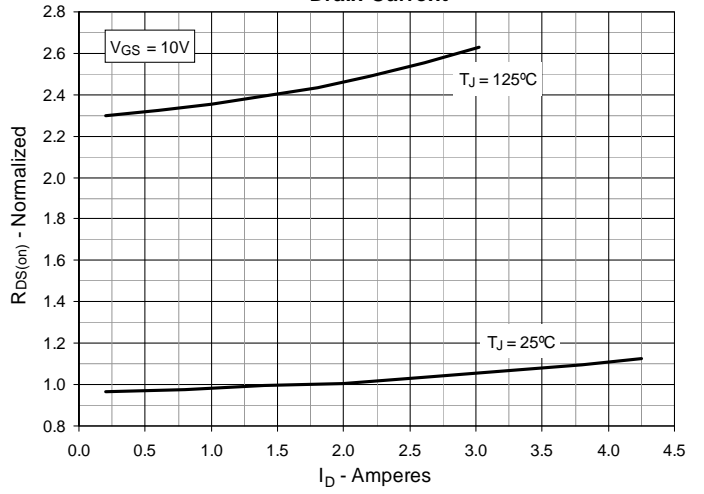


Fig. 5. Maximum Drain Current vs. Case Temperature

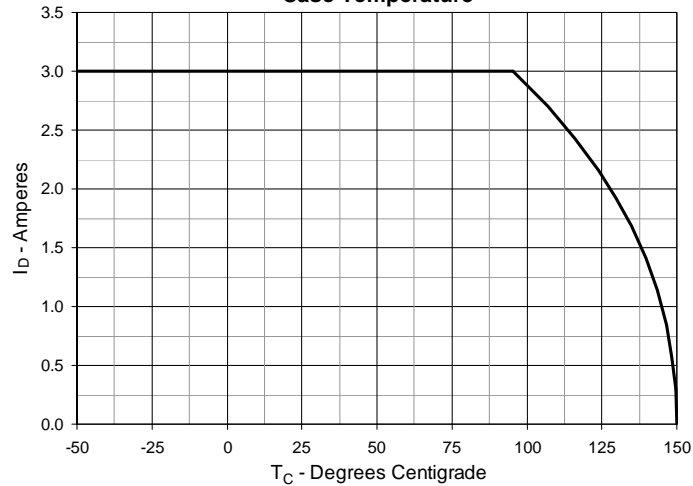
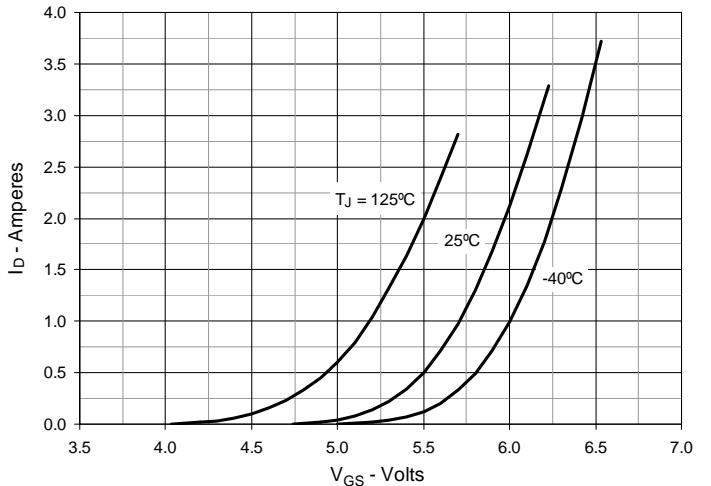
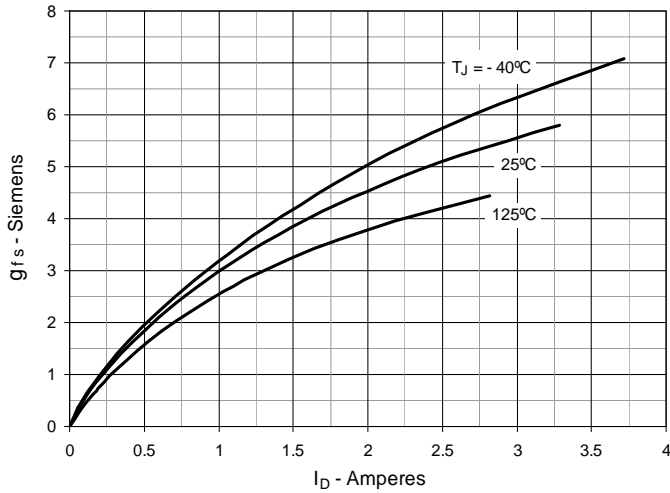


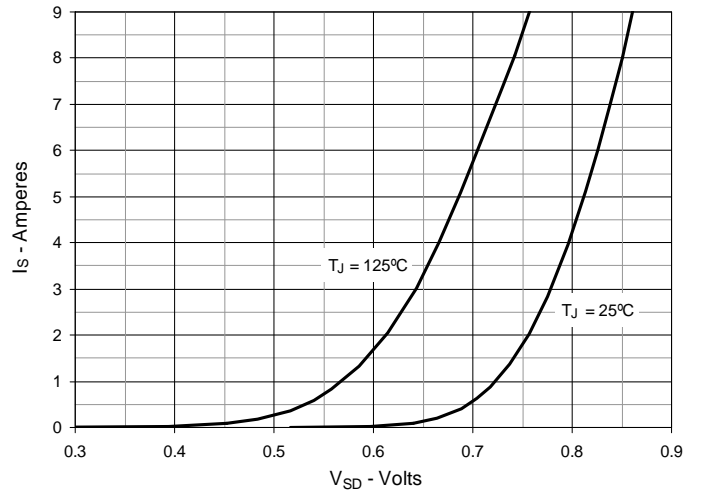
Fig. 6. Input Admittance



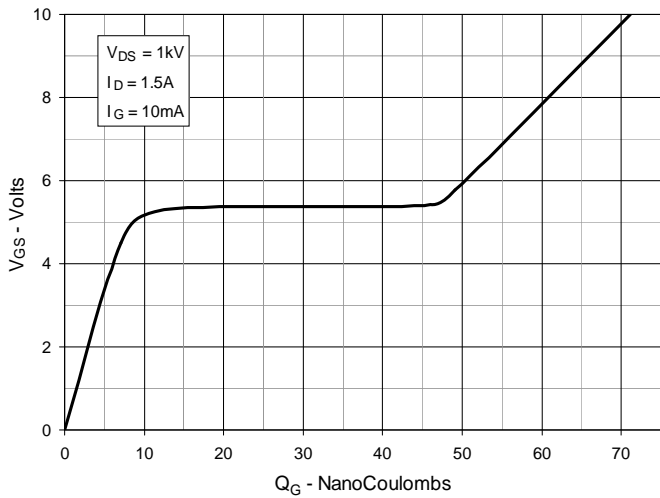
**Fig. 7. Transconductance**



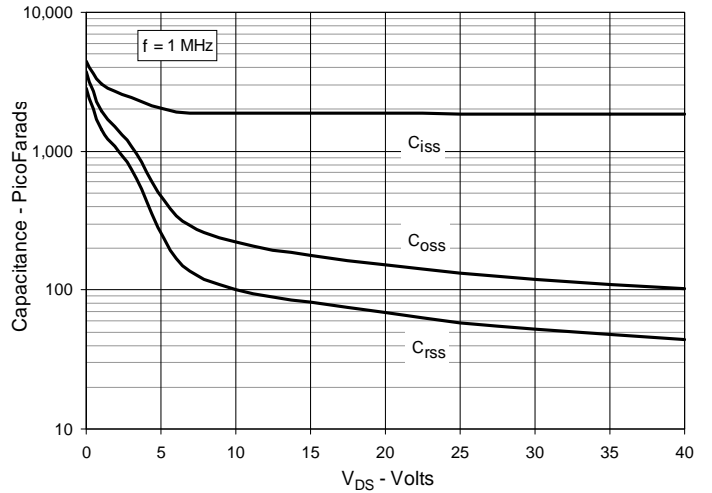
**Fig. 8. Forward Voltage Drop of Intrinsic Diode**



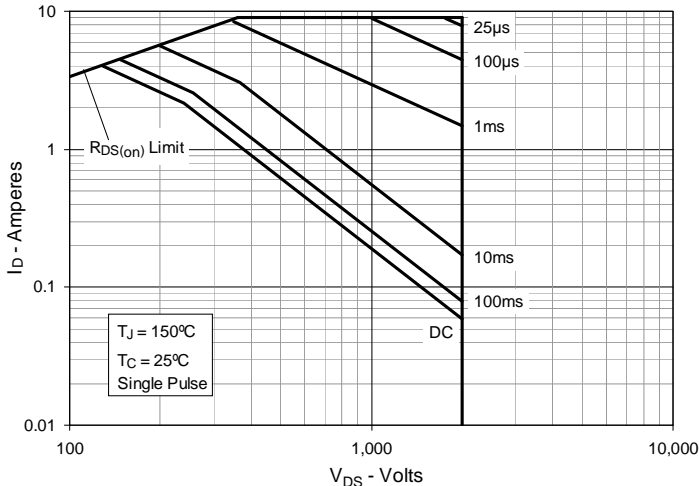
**Fig. 9. Gate Charge**



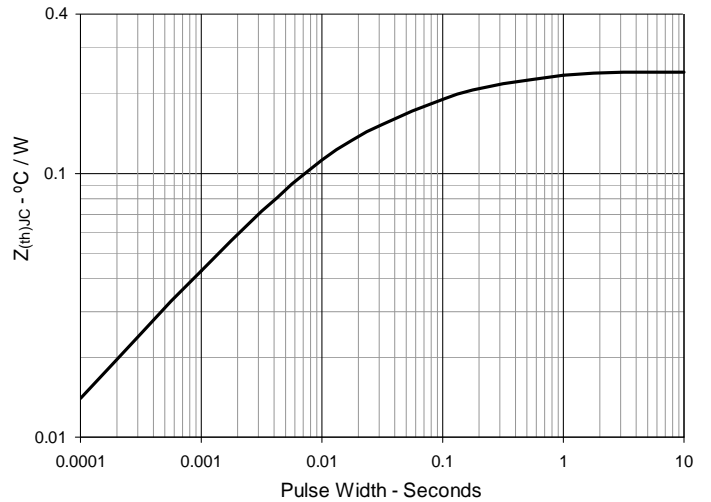
**Fig. 10. Capacitance**



**Fig. 11. Forward-Bias Safe Operating Area**



**Fig. 12 Maximum Transient Thermal Impedance**





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