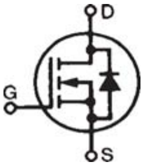
IXYS

High Voltage Power MOSFET

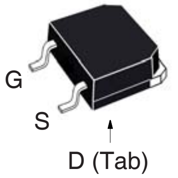
IXTT1N450HV
IXTH1N450HV

V_{DSS} = 4500V
I_{D25} = 1A
$R_{DS(on)}$ ≤ 80Ω

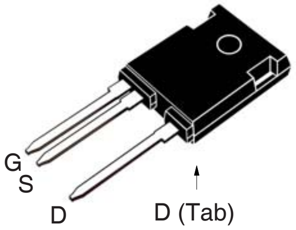
N-Channel Enhancement Mode



TO-268HV (IXTT)



TO-247HV (IXTH)



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

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	4500	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	4500	V
V_{GSS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_C = 25°C	1	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	3	A
P_D	T_C = 25°C	520	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-263HV)	10..65 / 22..14.6	N/lb
M_d	Mounting Torque (TO-247HV)	1.13/10	Nm/lb.in
Weight	TO-263HV	2.5	g
	TO-247HV	6.0	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	 Typ.	 Max.	
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250µA	3.5		6.0	V
I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
I_{DSS}	V_{DS} = 3.6kV, V_{GS} = 0V			5	µA
	V_{DS} = 4.5kV			25	µA
	V_{DS} = 3.6kV T_J = 100°C		15		µA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 50mA, Note 1			80	Ω

Features

- High Blocking Voltage
- High Voltage Package

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

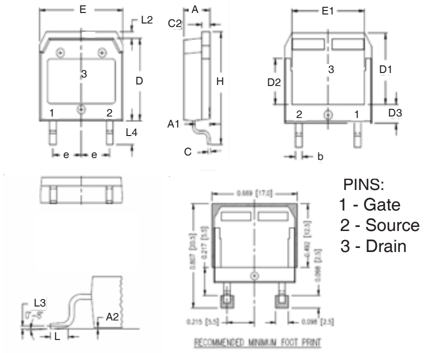
Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 50V, I_D = 200mA, Note 1	0.40	0.70		S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		1700		pF
C_{oss}			80		pF
C_{rss}			29		pF
R_{Gi}	Gate Input Resistance		12		Ω
$t_{d(on)}$	**Resistive Switching Times** V_{GS} = 10V, V_{DS} = 500V, I_D = 0.5 • I_{D25} R_G = 10Ω (External)		30		ns
t_r			43		ns
$t_{d(off)}$			73		ns
t_f			120		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 1kV, I_D = 0.5 • I_{D25}		46		nC
Q_{gs}			8		nC
Q_{gd}			23		nC
R_{thJC}				0.24	°C/W
R_{thCS}	TO-247HV		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			1	A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			5	A
V_{SD}	I_F = 1A, V_{GS} = 0V, Note 1			2.0	V
t_{rr}	I_F = 1A, -di/dt = 50A/μs, V_R = 100V		1.75		μs

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

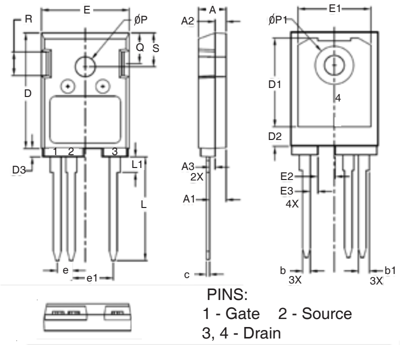
TO-268HV Outline



PINS:
1 - Gate
2 - Source
3 - Drain

SYM	INCHES MIN	INCHES MAX	MILLIMETER MIN	MILLIMETER 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 MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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 = 25ºC

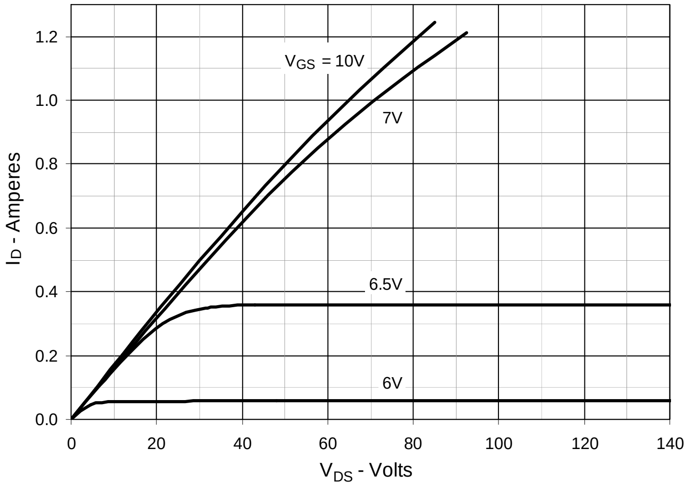


Fig. 2. Output Characteristics @ T_J = 125ºC

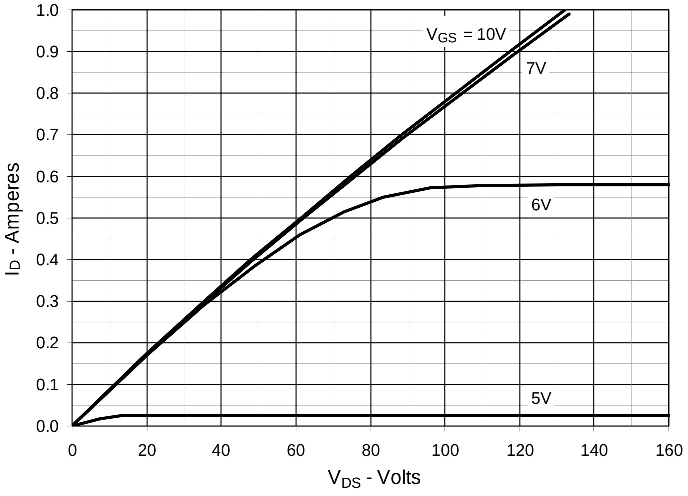


Fig. 3. $R_{DS(on)}$ Normalized to I_D = 0.5A Value vs. Junction Temperature

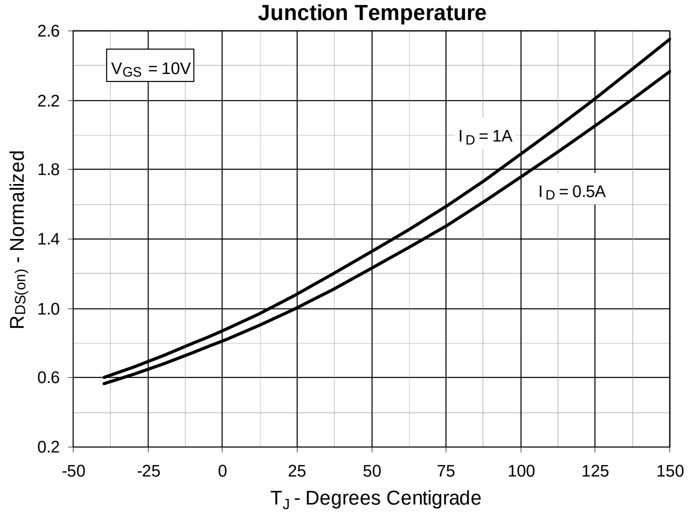


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 0.5A Value vs. Drain Current

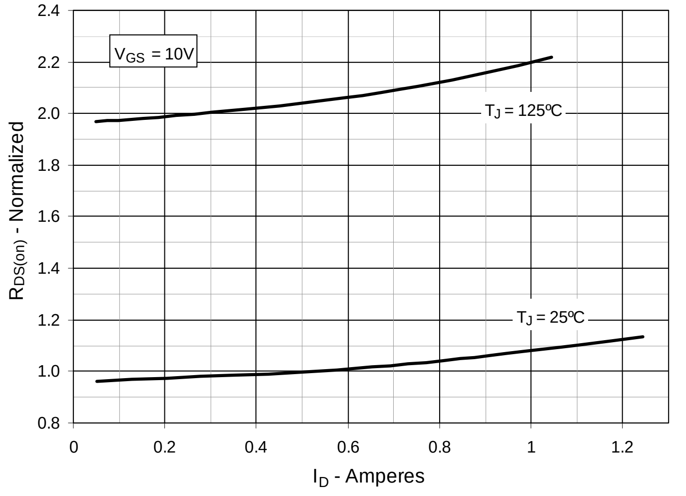


Fig. 5. Maximum Drain Current vs. Case Temperature

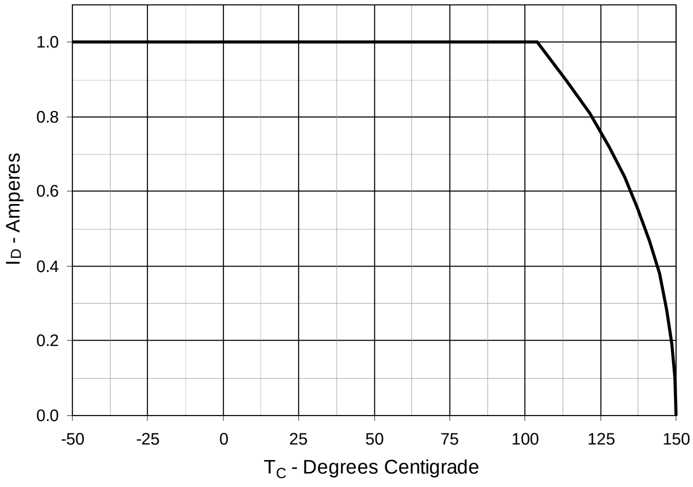
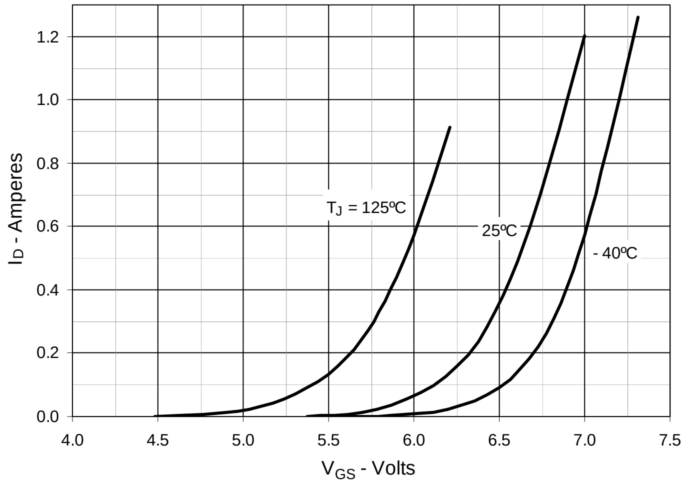


Fig. 6. Input Admittance



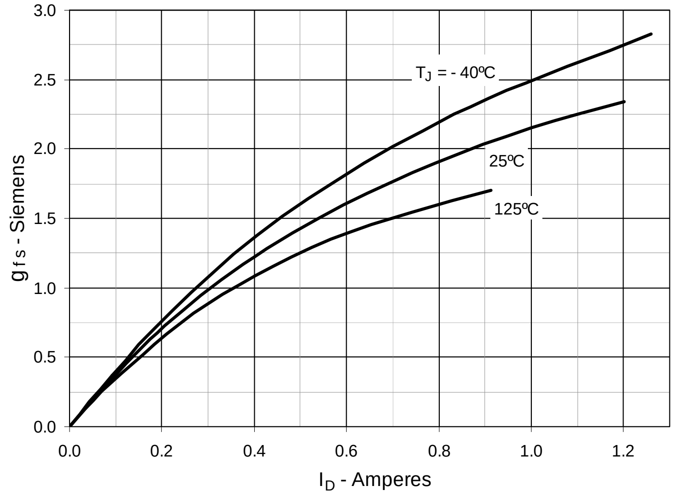


Fig. 7. Transconductance

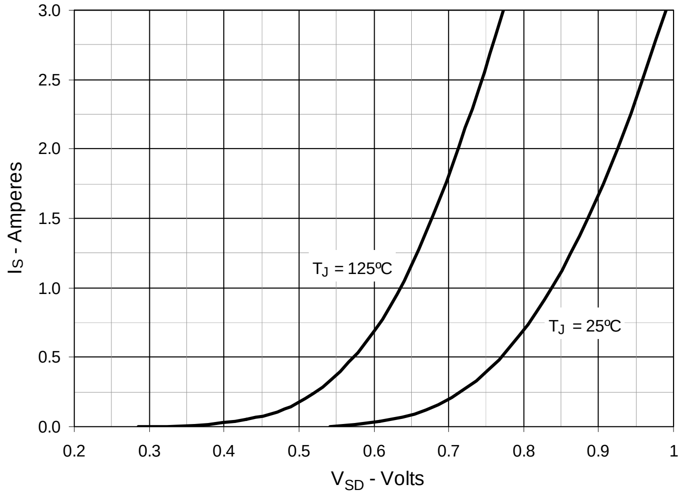


Fig. 8. Forward Voltage Drop of Intrinsic Diode

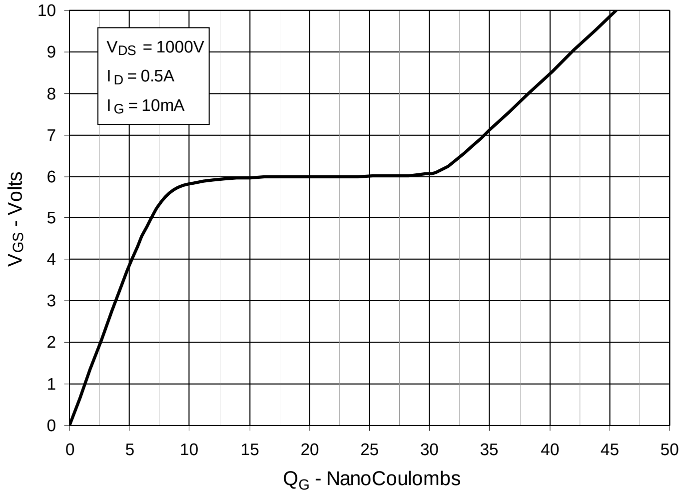


Fig. 9. Gate Charge

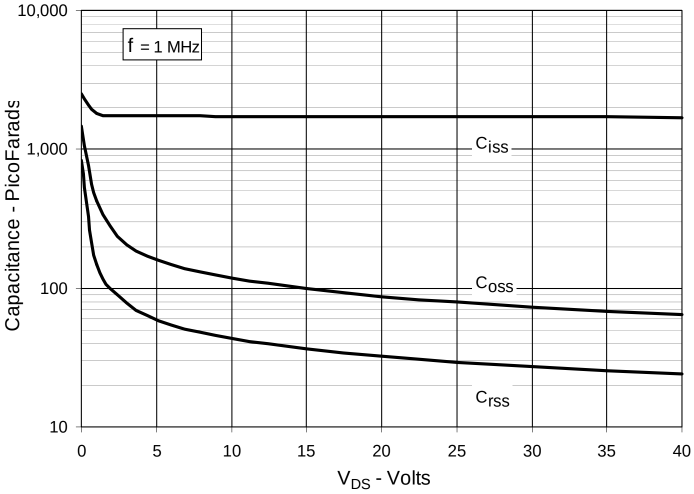


Fig. 10. Capacitance

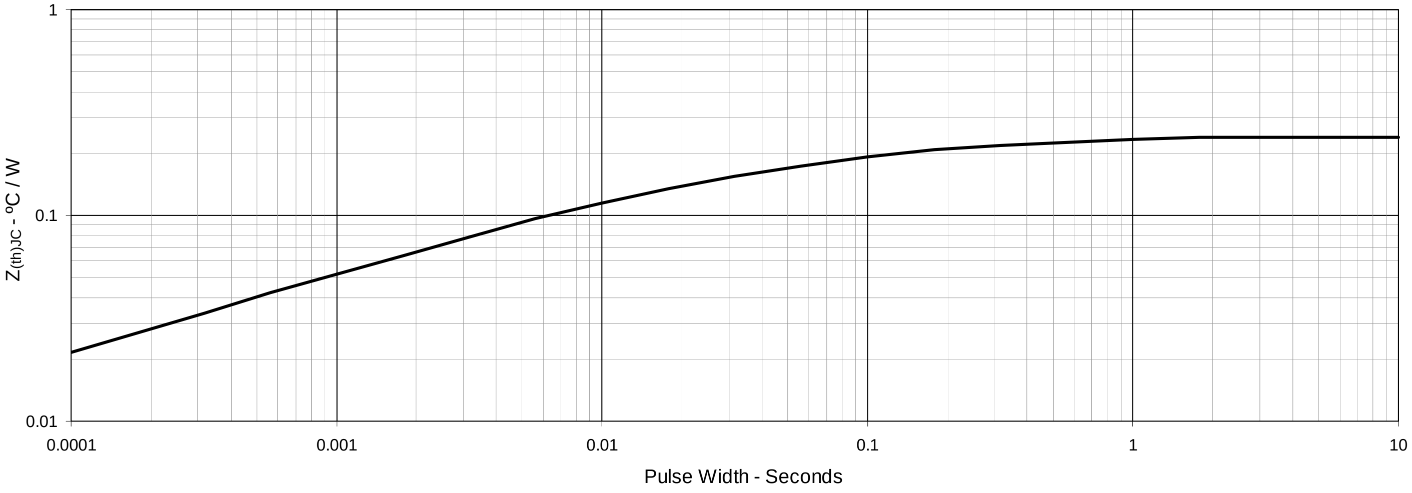


Fig. 11. Maximum Transient Thermal Impedance

Fig. 12. Forward-Bias Safe Operating Area @ T_C = 25ºC

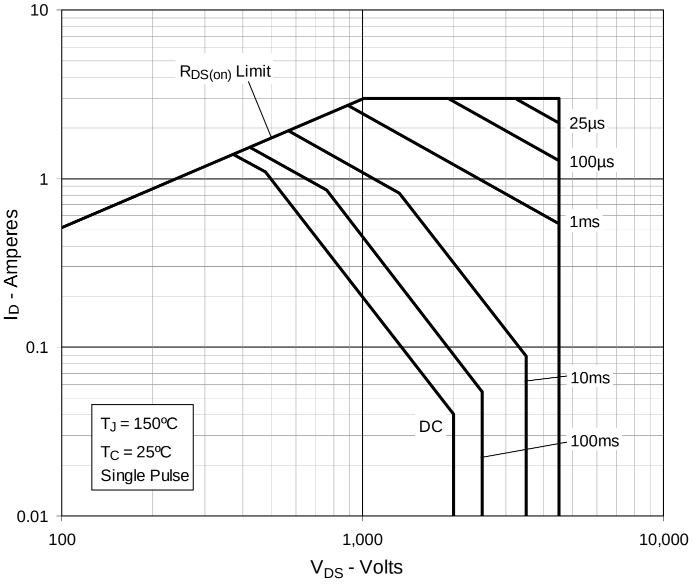
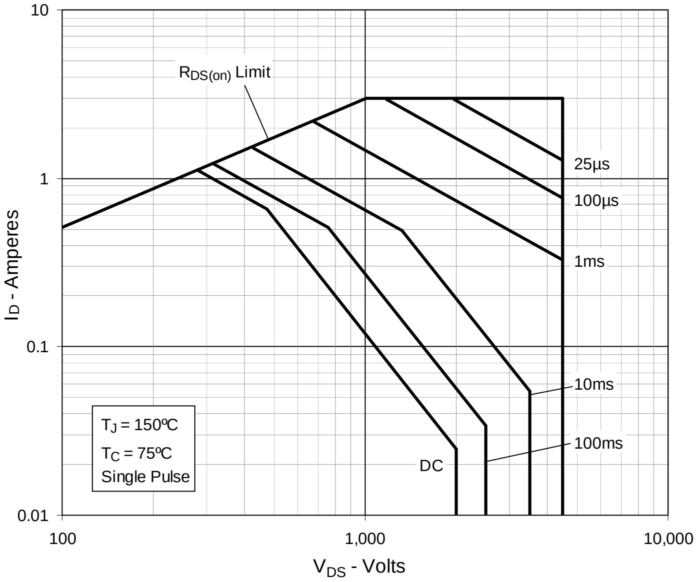


Fig. 13. Forward-Bias Safe Operating Area @ T_C = 75ºC



IXYS REF: T_1N450(H7-P640)10-11-13