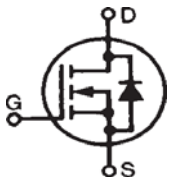
IXYS

High Voltage MOSFET

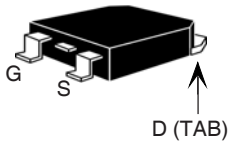
IXTH20N50D
IXTT20N50D

V_{DSX} = 500V
I_{D25} = 20A
$R_{DS(on)}$ ≤ 330mΩ

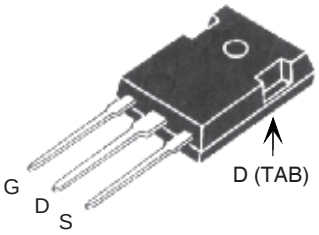
N-Channel, Depletion Mode



TO-268 (IXTT)



TO-247 (IXTH)



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

Symbol	Test Conditions	Maximum Ratings	
V_{DSX}	T_J = 25°C to 150°C	500	V
V_{DGX}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	500	V
V_{GSX}	Continuous	±30	V
V_{GSM}	Transient	±40	V
I_{D25}	T_C = 25°C	20	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	50	A
P_D	T_C = 25°C	400	W
T_J		- 55 ... +150	°C
T_{JM}		150	°C
T_{stg}		- 55 ... +150	°C
T_L	1.6mm (0.062 in.) from Case for 10s	300	°C
T_{SOLD}	Plastic Body for 10s	260	°C
M_d	Mounting Torque (TO-247)	1.13 / 10	Nm/lb.in.
Weight	TO-268	4	g
	TO-247	6	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{DSX}	V_{GS} = -10V, I_D = 250μA	500			V
$V_{GS(off)}$	V_{DS} = 25V, I_D = 250μA	-1.5		- 3.5	V
I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V			±100	nA
I_{DSS}	V_{DS} = V_{DSX}, V_{GS}= -10V			25	μA
	T_J = 125°C			500	μA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 10A, Note 1			330	mΩ
$I_{D(on)}$	V_{GS} = 0V, V_{DS} = 25V, Note 1		2.3		A

Features

- Normally ON Mode
- International Standard Packages
- Molding Epoxies Meet UL 94 V-0 Flammability Classification

Advantages

- Easy to Mount
- Space Savings
- High Power Density

Applications

- Level Shifting
- Triggers
- Solid State Relays
- Current Regulators
- Active Load

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 30V, I_D = 0.5 • I_{D25}, Note 1	4.0	6.5	9.0	S
C_{iss}	V_{GS} = -10V, V_{DS} = 25V, f = 1MHz		6300		pF
C_{oss}			385		pF
C_{rss}			82		pF
$t_{d(on)}$	**Resistive Switching Times**		35		ns
t_r	V_{GS} = -10V, V_{DS} = 0.5 • V_{DSX}, I_D = 0.5 • I_{D25}		85		ns
$t_{d(off)}$	R_G = 4.7Ω (External)		110		ns
t_f			75		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSX}, I_D = 0.5 • I_{D25}		78.5		nC
Q_{gs}			19.2		nC
Q_{gd}			35.0		nC
R_{thJC}				0.31	°C/W
R_{thCS}			0.21		°C/W

Safe Operating Area Specification

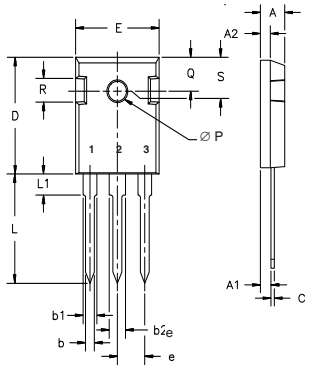
Symbol	Test Conditions	Min.	Typ.	Max.	
SOA	V_{DS} = 400V, I_D = 0.6A, T_C = 75°C, t_p = 3s	240			W

Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
V_{SD}	I_F = I_{D25}, V_{GS} = -10V, Note 1		0.75	1.4	V
t_{rr}	I_F = 20A, -di/dt = 100A/μs		590		ns
I_{RM}	V_R = 100V, V_{GS} = -10V		32.6		A
Q_{RM}			9.6		μC

Note 1: Pulse Test, t ≤ 300μs; Duty Cycle, d ≤ 2%.

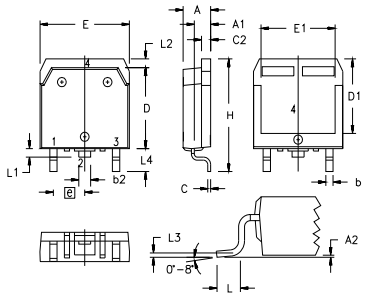
TO-247 (IXTH) Outline



Terminals: 1 - Gate 2 - Drain
3 - Source Tab - Drain

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.7	5.3	.185	.209
A_1	2.2	2.54	.087	.102
A_2	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b_1	1.65	2.13	.065	.084
b_2	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
ØP	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15 BSC		242 BSC	

TO-268 (IXTT) Outline



SYM	INCHES MIN	MAX	MILLIMETERS 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
b2	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.488	.500	12.40	12.70
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	.094	.106	2.40	2.70
L1	.047	.055	1.20	1.40
L2	.039	.045	1.00	1.15
L3	.010 BSC		0.25 BSC	
L4	.150	.161	3.80	4.10

Fig. 1. Output Characteristics @ 25ºC

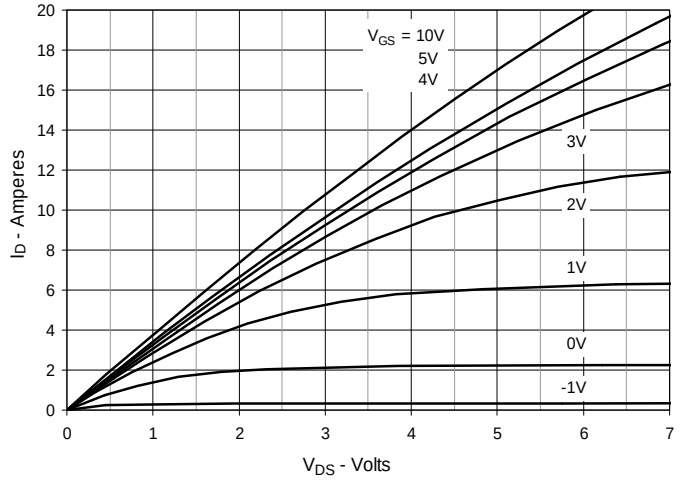


Fig. 2. Extended Output Characteristics @ 25ºC

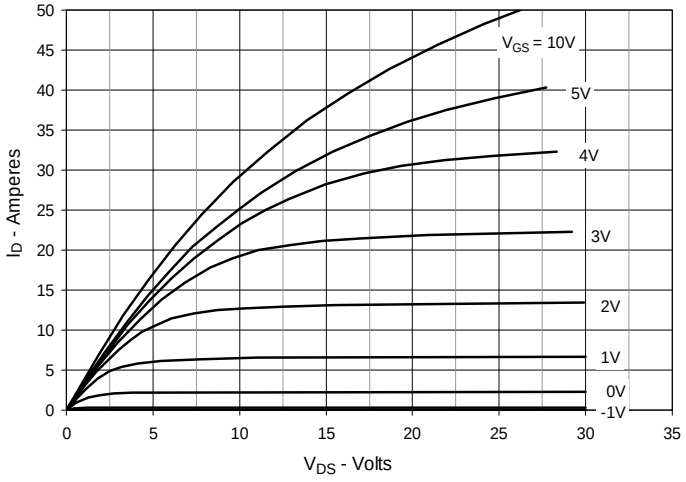


Fig. 3. Output Characteristics @ 125ºC

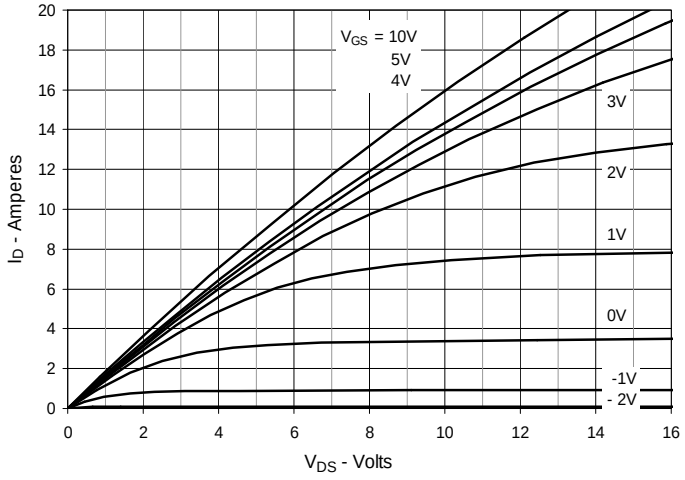


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 10A Value vs. Junction Temperature

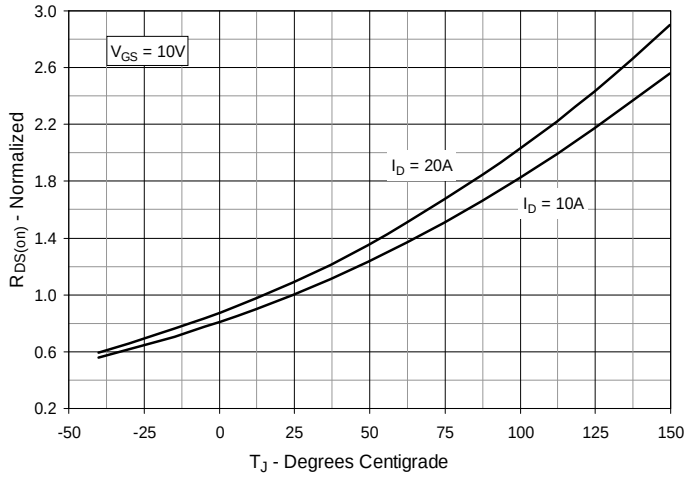


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 10A Value vs. Drain Current

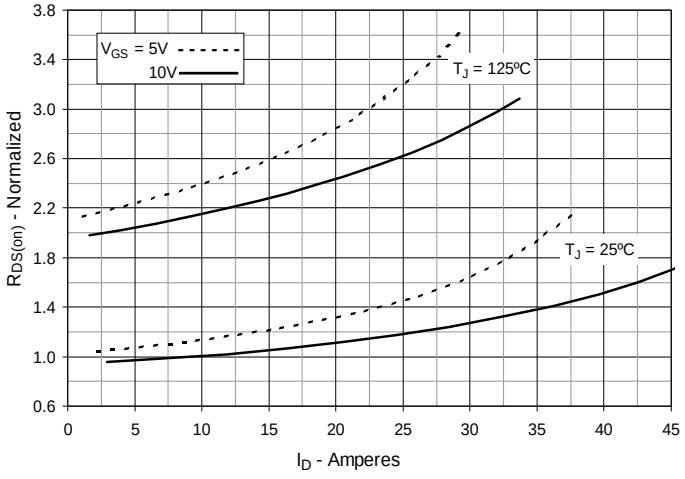


Fig. 6. Maximum Drain Current vs. Case Temperature

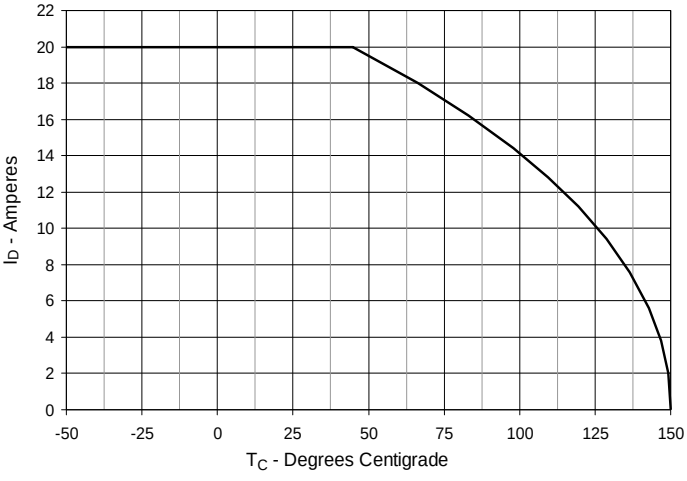


Fig. 7. Input Admittance

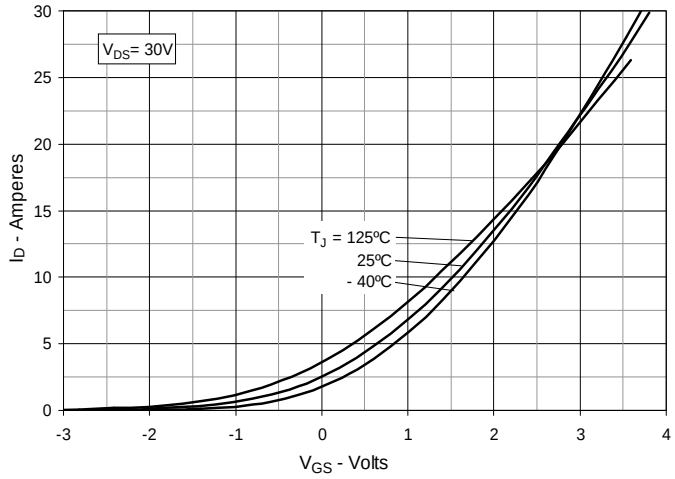


Fig. 8. Transconductance

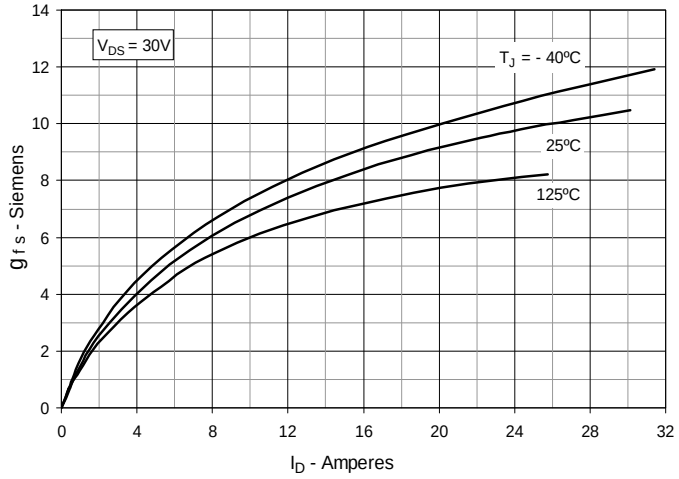


Fig. 9. Forward Voltage Drop of Intrinsic Diode

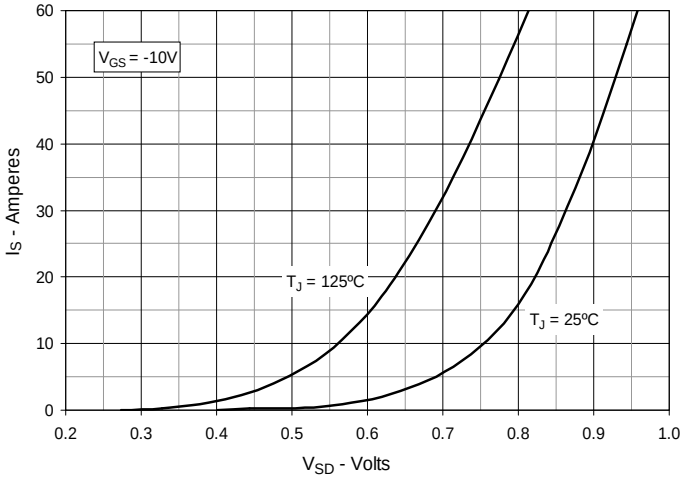


Fig. 10. Breakdown and Threshole Voltages vs. Junction Temperature

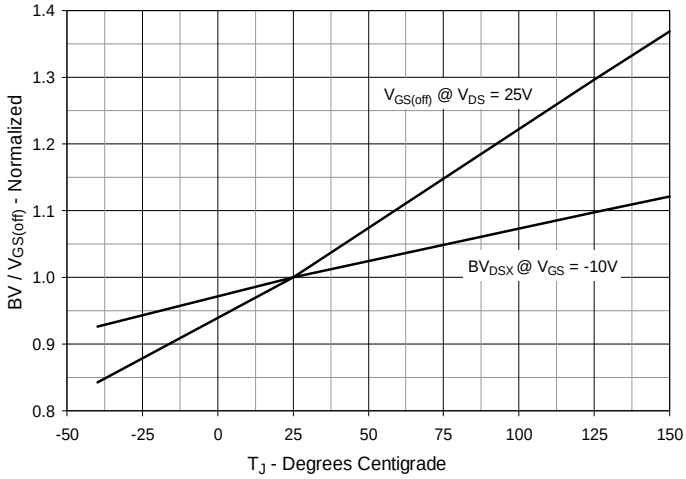


Fig. 11. Gate Charge

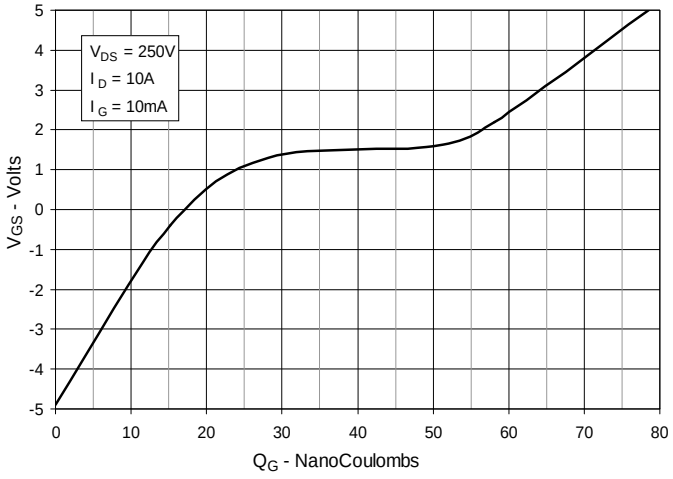


Fig. 12. Capacitance

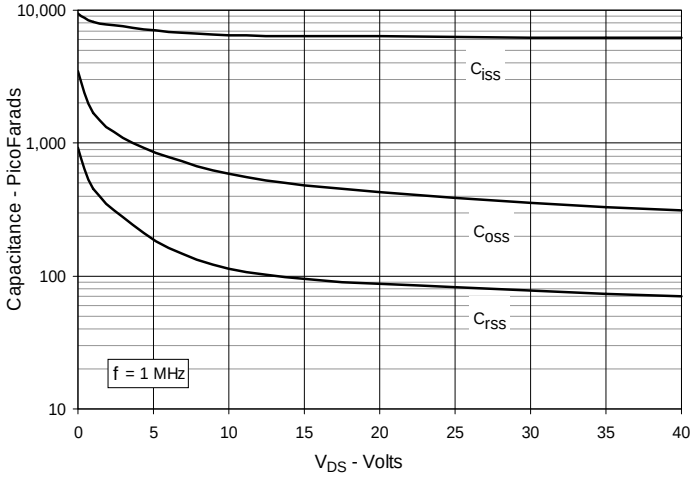


Fig. 13. Forward-Bias Safe Operating Area @ T_C = 25ºC

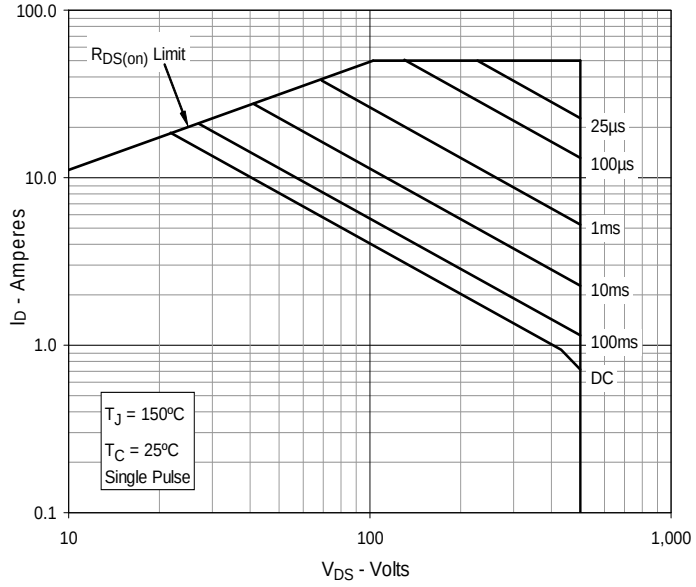


Fig. 14. Forward-Bias Safe Operating Area @ T_C = 75ºC

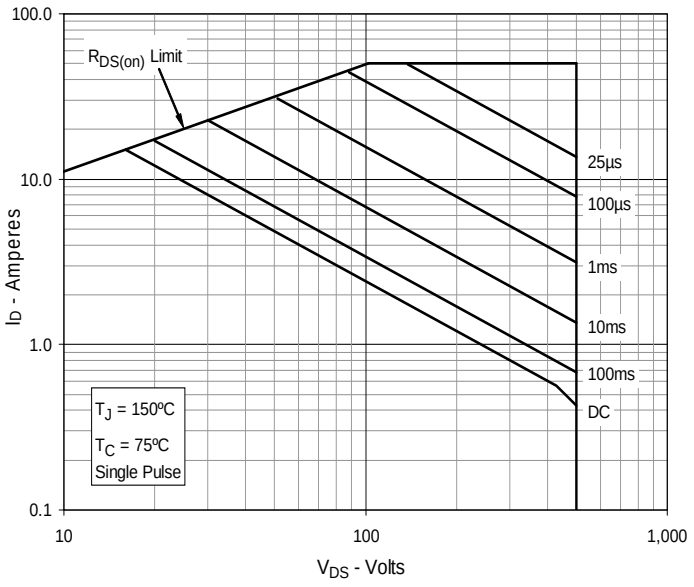


Fig. 15. Maximum Transient Thermal Impedance