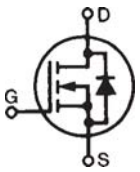
IXYS

High Voltage MOSFET

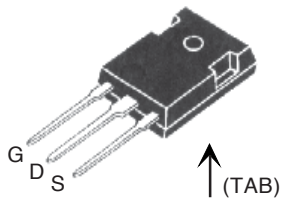
N-Channel, Depletion Mode

Preliminary Data Sheet

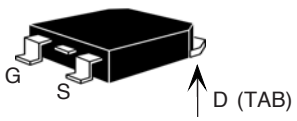
IXTH 20N50D	V_{DSS}	= 500 V
IXTT 20N50D	I_{D25}	= 20 A
	$R_{DS(on)}$	= 0.33 Ω



TO-247 (IXFH)



TO-268 (IXTT)



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	500	V
V_{GS}	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	1.6 mm (0.063 in) from case for 10 seconds	300	°C
T_{ISOL}	Plastic case for 10 seconds	300	°C
M_d	Mounting torque	1.13/10	Nm/lb.in.
Weight	TO-247	6	g
	TO-268	4	g

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_{DSX}	V_{GS} = -10 V, I_D = 250 mA		500			V
$V_{GS(off)}$	V_{DS} = 25 V, I_D = 250 mA		-1.5		-3.5	V
I_{GSS}	V_{GS} = ± 30 V_{DC}, V_{DS} = 0				± 100	nA
$I_{DSX(off)}$	V_{DS} = V_{DSS}	T_J = 25°C			25	μA
	V_{GS} = -10 V	T_J = 125°C			500	μA
$R_{DS(on)}$	V_{GS} = 10 V, I_D = 10 A	Note 1			0.33	Ω
$I_{D(on)}$	V_{GS} = 0 V, V_{DS} = 25 V	Note 1		1.5		A

Features

- Normally ON Mode
- International standard packages
- Molding epoxies meet UL 94 V-0 flammability classification

Applications

- Level shifting
- Triggers
- Solid State Relays
- Current Regulators
- Active load

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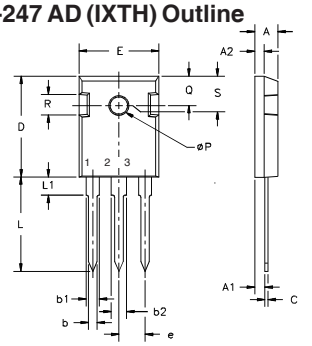
Symbol	Test Conditions (T$_J$ = 25°C, unless otherwise specified)	Characteristic Values min.	typ.	max.	
g_{fs}	V_{DS}= 30 V, I_D =10 A, Note 1	4.0	7.5		S
C_{iss}	V_{GS} = -10 V, V_{DS} = 25 V, f = 1 MHz		2500		pF
C_{oss}			400		pF
C_{rss}			100		pF
$t_{d(on)}$	V_{GS}= 0 V to -10 V, V_{DS} = 0.5 • V_{DSX} I_D = 10 A, R_G = 4.7 Ω (External),		35		ns
t_r			85		ns
$t_{d(off)}$			110		ns
t_f			75		ns
$Q_{g(on)}$	V_{GS} = 10 V, V_{DS} = 0.5 • V_{DSX}, I_D = 0.5 • I_{D25}		125		nC
Q_{gs}			35		nC
Q_{gd}			51		nC
R_{thJC}				0.31	K/W
R_{thCK}			0.25		K/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} = -10 V, Note 1		0.85	1.5	V
t_{rr}	I_F = 20A, -di/dt = 100 A/μs, V_R = 100 V v_{GS}= -10 V		510		ns

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

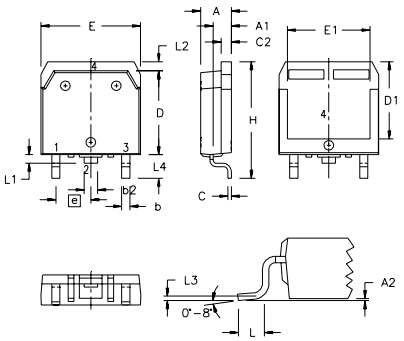
TO-247 AD (IXTH) Outline



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 (IXTTH) Outline



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

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

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 4,850,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405B2 6,710,463 6,727,585

Fig. 1. Output Characteristics @ 25ºC

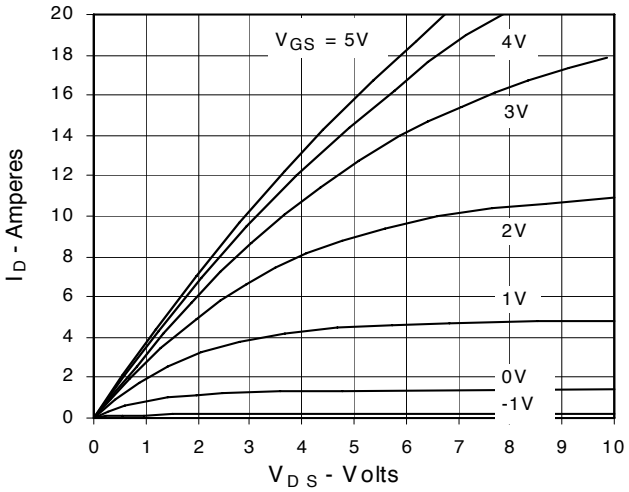


Fig. 2. Extended Output Characteristics @ 25ºC

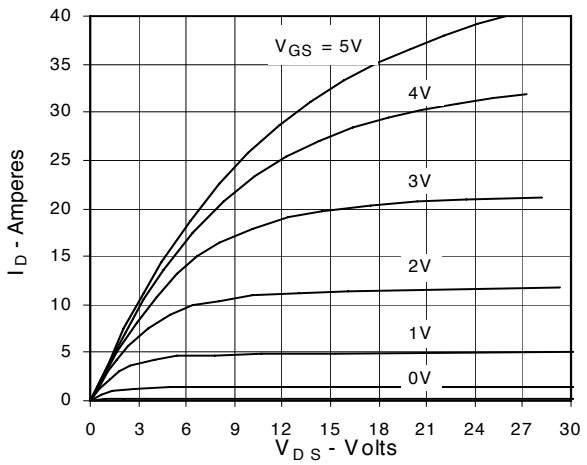


Fig. 3. Output Characteristics @ 125ºC

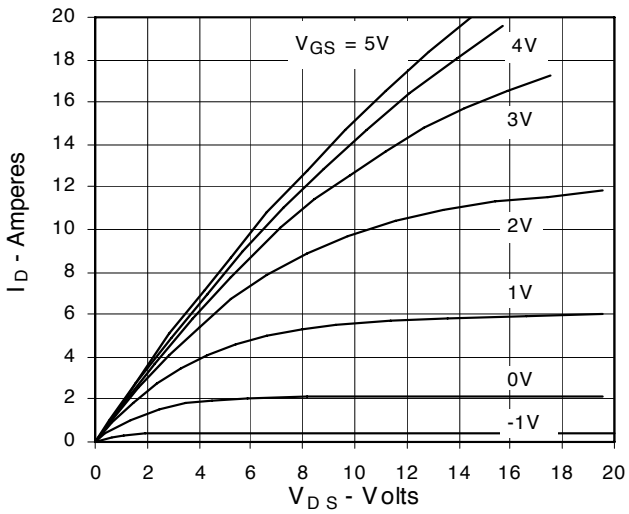


Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. Junction Temperature

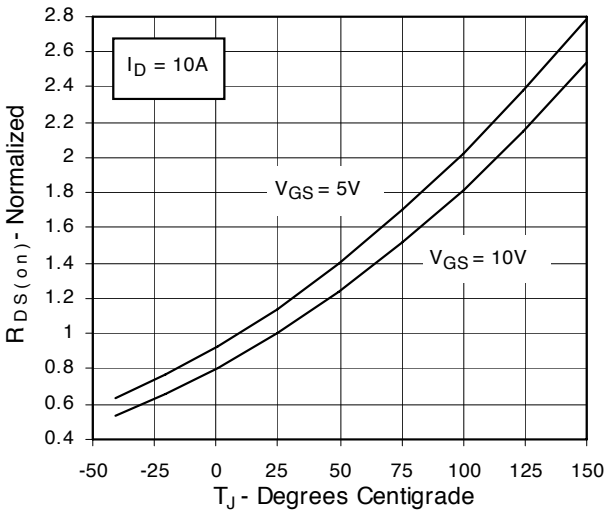


Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. I_D

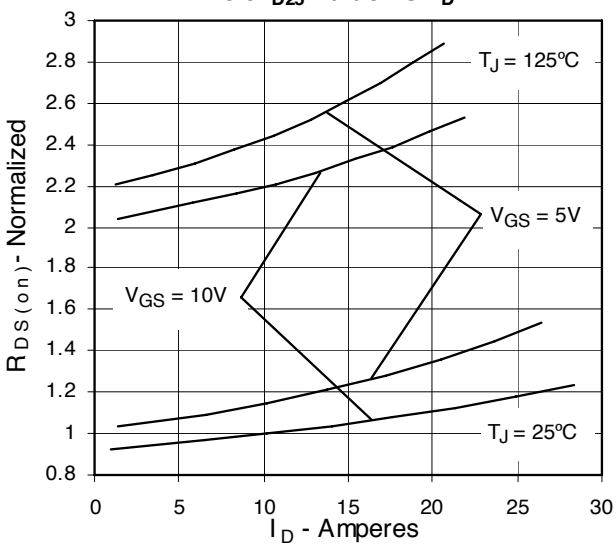


Fig. 6. Drain Current vs. Case Temperature

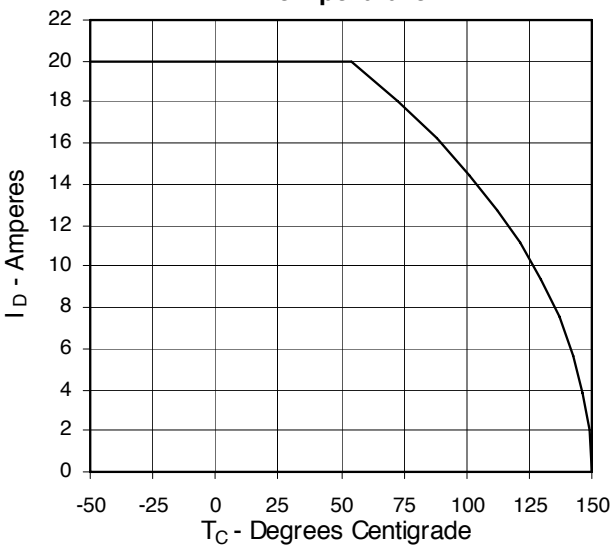


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Fig. 7. Input Admittance

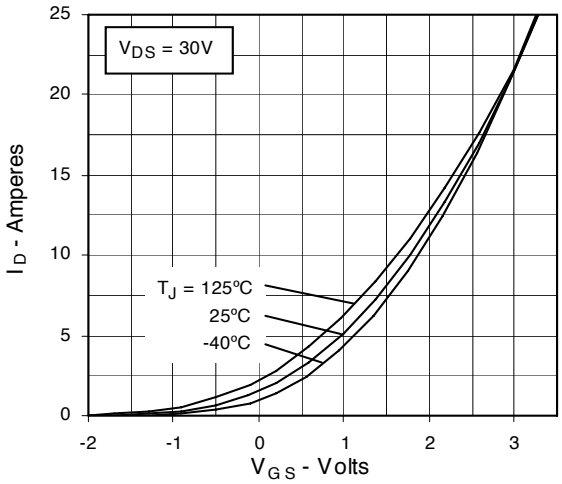

Fig. 8. Transconductance

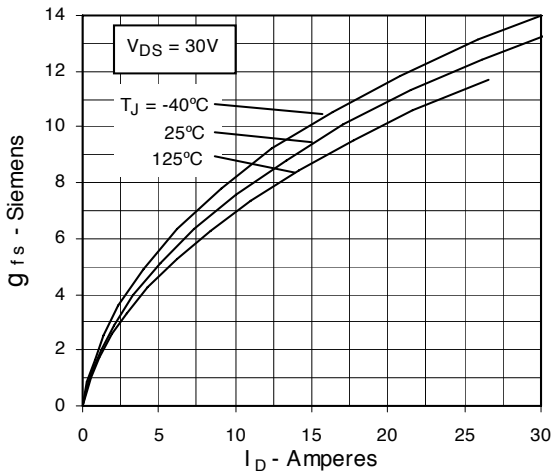

Fig. 9. Source Current vs. Source-To-Drain Voltage

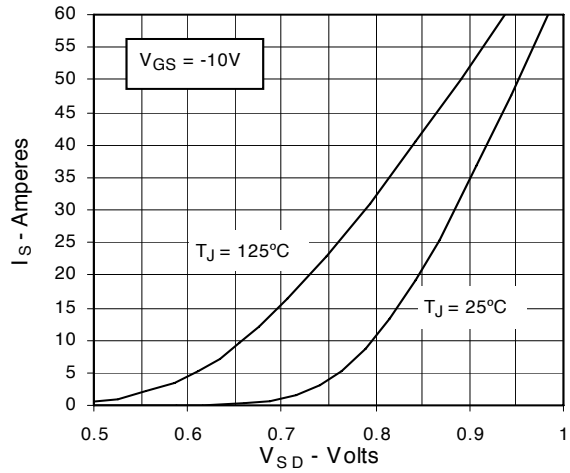

Fig. 10. Dependence of Breakdown and Threshole Voltages on Temperature

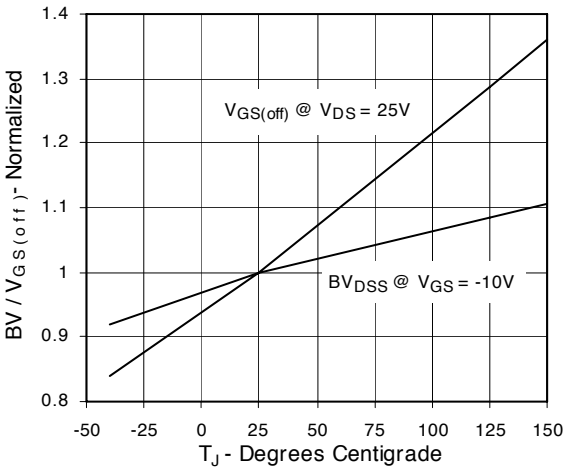

Fig. 11. Gate Charge

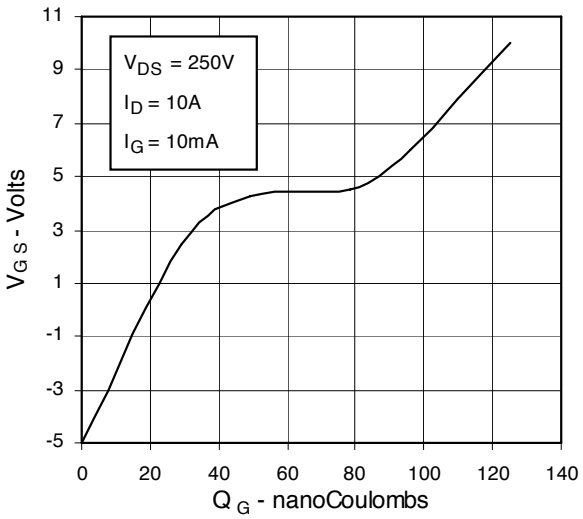

Fig. 12. Capacitance

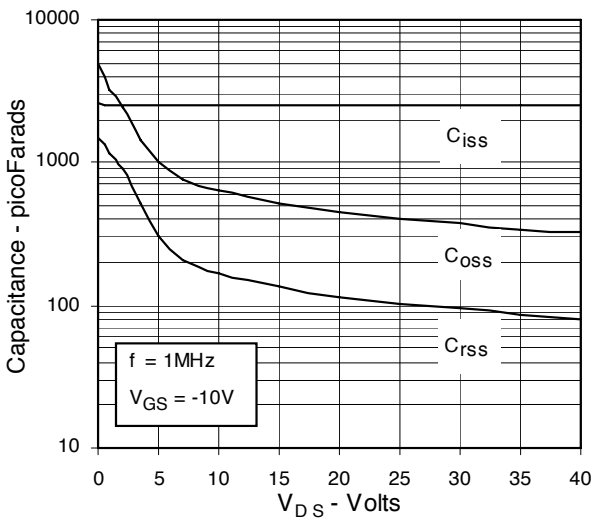

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Fig. 13. Forward-Bias Safe Operating Area

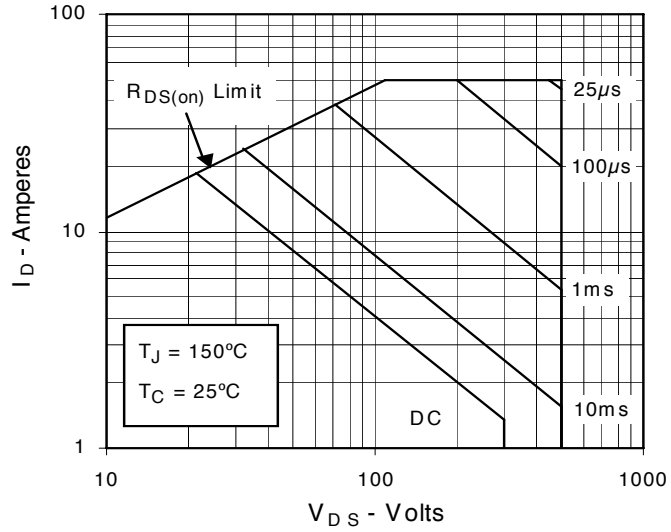
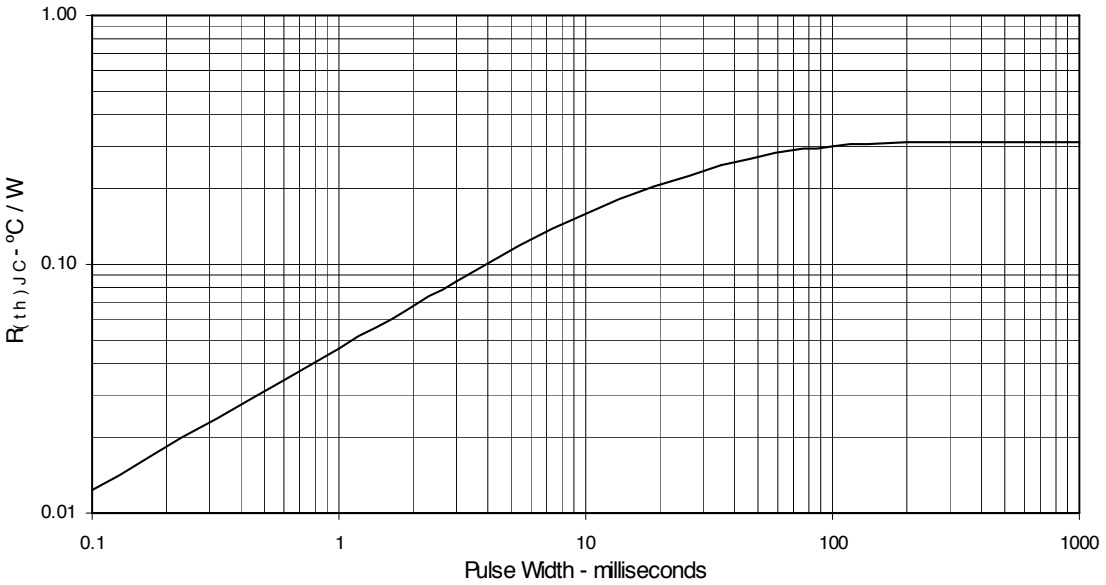


Fig. 14. Maximum Transient Thermal Resistance



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