IXYS

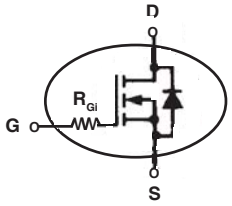
Preliminary Technical Information

Power MOSFET with Extended FBSOA

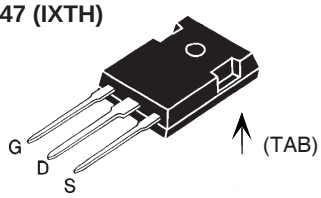
N-Channel Enhancement Mode

IXTH30N50L
IXTQ30N50L
IXTT30N50L

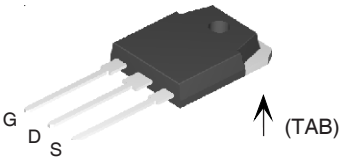
V_{DSS} = 500V
I_{D25} = 30A
$R_{DS(on)}$ ≤ 0.20Ω



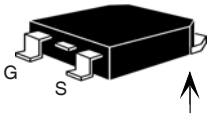
TO-247 (IXTH)



TO-3P (IXTQ)



TO-268 (IXTT)



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

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	500	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	500	V
V_{GSS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_C = 25°C	30	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}	60	A
I_{AR}	T_C = 25°C	30	A
E_{AR}	T_C = 25°C	50	mJ
E_{AS}		1.5	J
P_D	T_C = 25°C	400	W
T_J		-55 to +150	°C
T_{JM}		+150	°C
T_{stg}		-55 to +150	°C
T_L	1.6mm (0.063in) from case for 10s	300	°C
T_{SOLD}	Plastic body for 10s	260	°C
M_d	Mounting torque (TO-247, TO-3P)	1.13/10	Nm/lb.in.
Weight	TO-247	6.0	g
	TO-3P	5.5	g
	TO-268	5.0	g

Symbol	Test Conditions	Characteristic Values		
(T_J = 25°C, unless otherwise specified)		Min.	Typ.	Max.
BV_{DSS}	V_{GS} = 0V, I_D = 250μA	500		V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.5		4.5 V
I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V			±100 nA
I_{DSS}	V_{DS} = V_{DSS}			50 μA
	V_{GS} = 0V T_J = 125°C			300 μA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 0.5 • I_{D25}, Note 1			0.20 Ω

Features

- Designed for linear operation
- International standard packages
- Unclamped Inductive Switching (UIS) rated.
- Molding epoxies meet UL 94 V-0 flammability classification
- Integrated gate resistor for easy paralleling
- Guaranteed FBSOA at 75°C

Applications

- Solid state circuit breakers
- Soft start controls
- Linear amplifiers
- Programmable loads
- Current regulators

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 10V, I_D = 0.5 • I_{D25}, Note 1	9	12	15	S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		10.2		nF
C_{oss}			540		pF
C_{rss}			127		pF
R_{Gi}	Integrated gate input resistor		3.5		Ω
$t_{d(on)}$	**Resistive Switching Times** V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25} R_G = 0Ω (External)		35		ns
t_r			117		ns
$t_{d(off)}$			94		ns
t_f			40		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		240		nC
Q_{gs}			58		nC
Q_{gd}			135		nC
R_{thJC}				0.31	°C/W
R_{thCS}	(TO-247, TO-3P)		0.25		°C/W

Safe Operating Area Specification

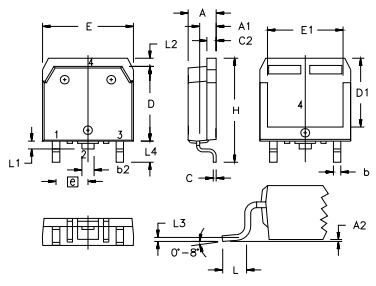
Symbol	Test Conditions	Min.	Typ.	Max.	
SOA	V_{DS} = 400V, I_D = 0.5A, T_C = 75°C, t_p = 2s	200			W

Source-Drain Diode — Characteristic Values (T_J = 25°C, unless otherwise specified)

Symbol	Test Conditions	Min.	Typ.	Max.	
I_S	V_{GS} = 0V			30	A
I_{SM}	Repetitive, pulse width limited by T_{JM}			120	A
V_{SD}	I_F = I_S, V_{GS} = 0V, Note 1			1.5	V
t_{rr}	I_F = I_S, -di/dt = 100A/μs, V_R = 100V		500		ns

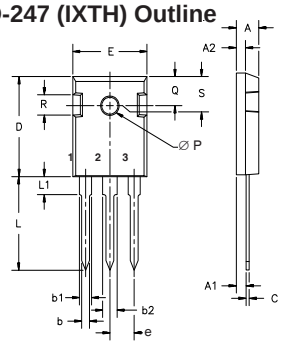
Note 1: Pulse test, t ≤ 300μs; duty cycle, d ≤ 2%.

TO-268 (IXTT) Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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

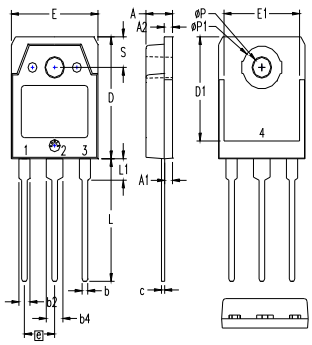
TO-247 (IXTH) Outline



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

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches 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-3P (IXTQ) Outline



1 – GATE
2 – DRAIN (COLLECTOR)
3 – SOURCE (EMITTER)
4 – DRAIN (COLLECTOR)

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.185	.193	4.70	4.90
A1	.051	.059	1.30	1.50
A2	.057	.065	1.45	1.65
b	.035	.045	0.90	1.15
b2	.075	.087	1.90	2.20
b4	.114	.126	2.90	3.20
c	.022	.031	0.55	0.80
D	.780	.799	19.80	20.30
D1	.665	.677	16.90	17.20
E	.610	.622	15.50	15.80
E1	.531	.539	13.50	13.70
e	.215 BSC		5.45 BSC	
L	.779	.795	19.80	20.20
L1	.134	.142	3.40	3.60
ØP	.126	.134	3.20	3.40
ØP1	.272	.280	6.90	7.10
S	.193	.201	4.90	5.10

PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

IXYS reserves the right to change limits, test conditions, and dimensions.

Fig. 1. Output Characteristics @ T_J = 25ºC

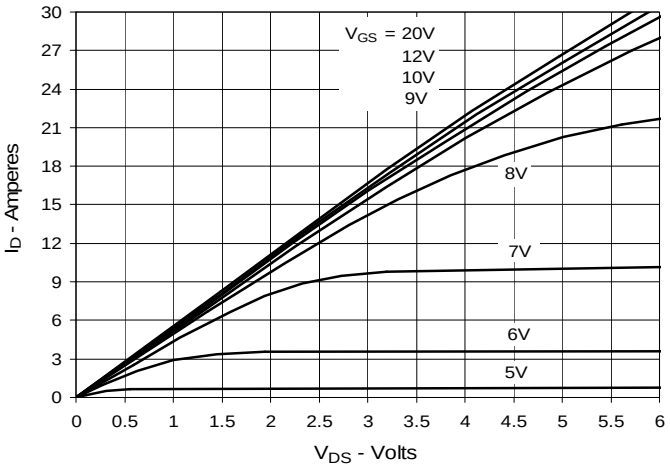


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

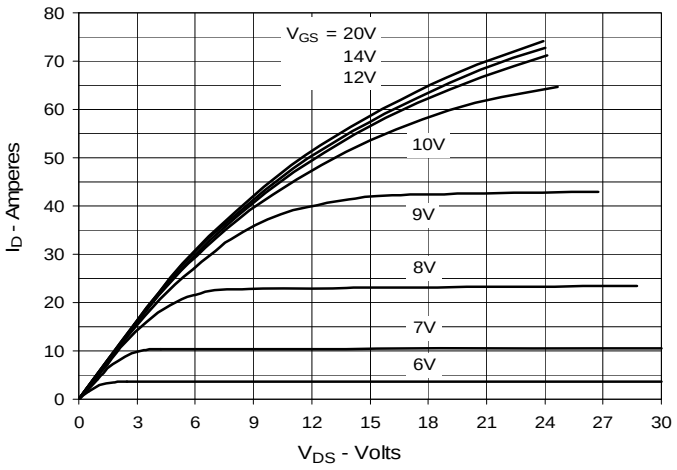


Fig. 3. Output Characteristics @ T_J = 125ºC

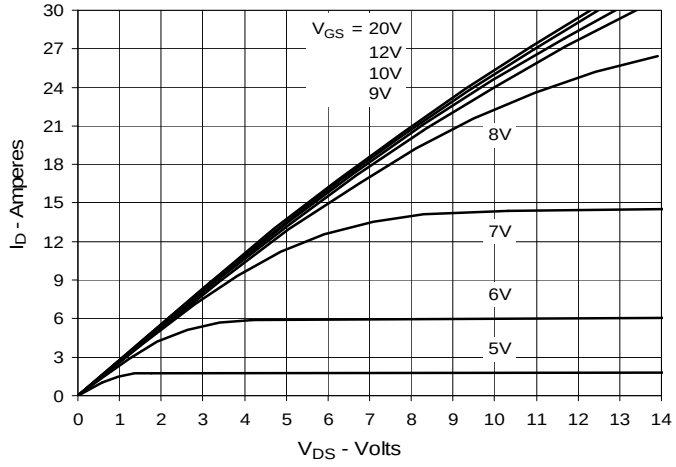


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 15A Value vs. Junction Temperature

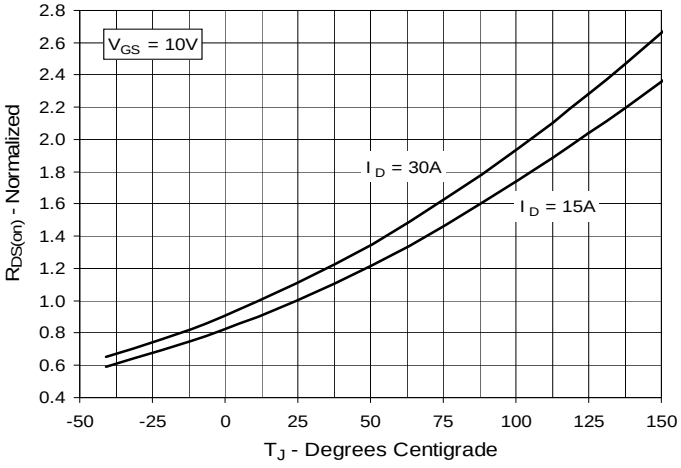


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 15A Value vs. Drain Current

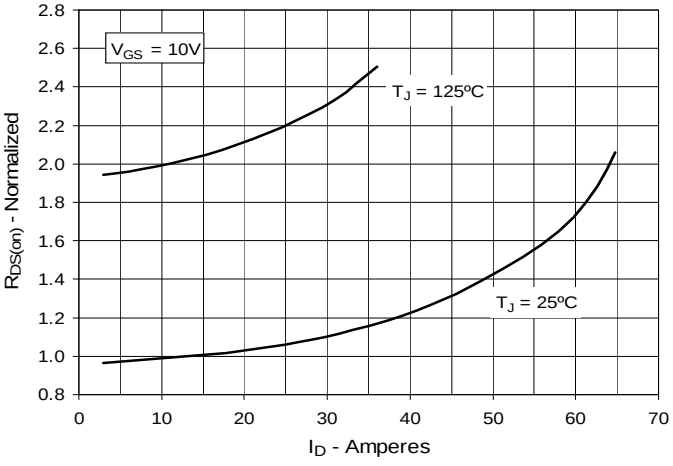


Fig. 6. Maximum Drain Current vs. Case Temperature

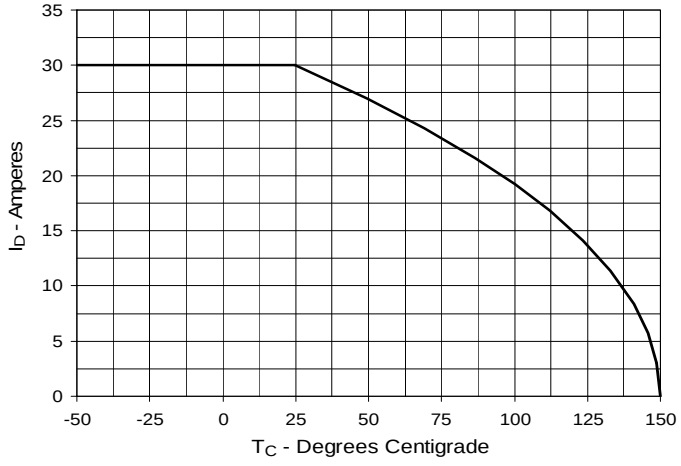


Fig. 7. Input Admittance

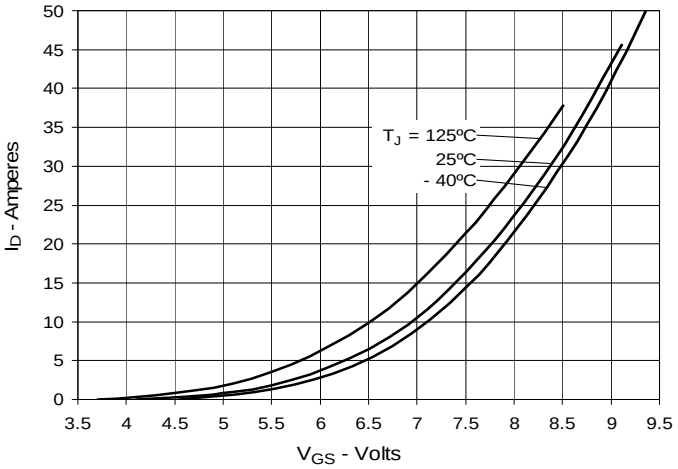


Fig. 8. Transconductance

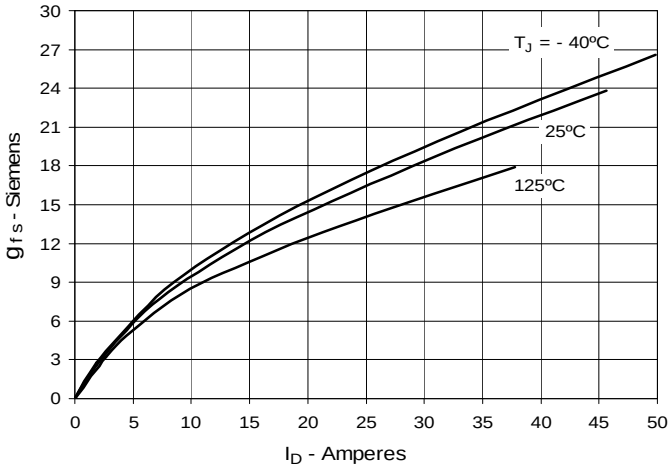


Fig. 9. Forward Voltage Drop of Intrinsic Diode

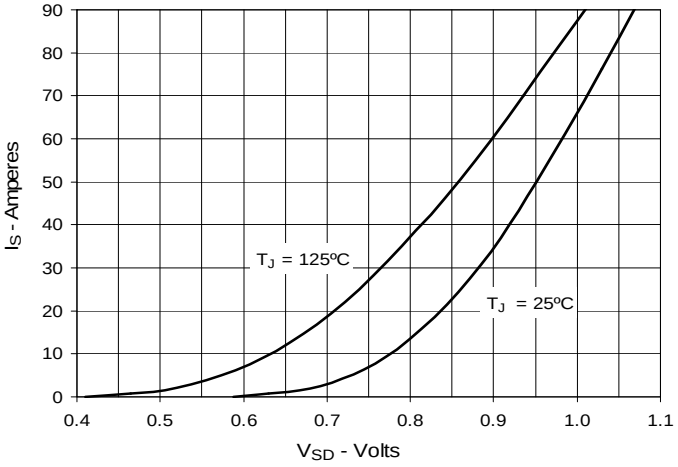


Fig. 10. Gate Charge

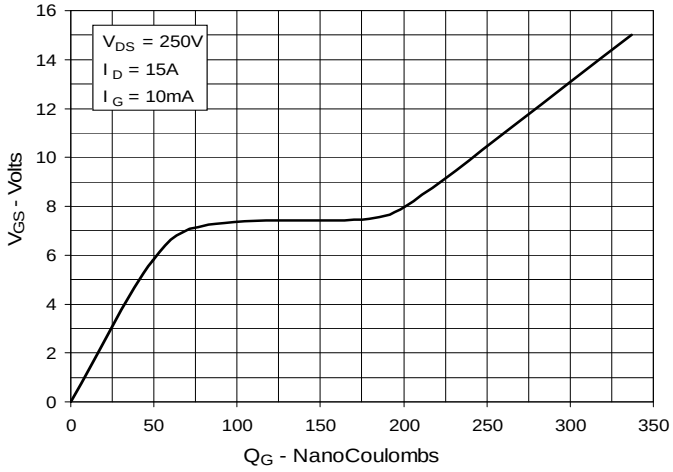


Fig. 11. Capacitance

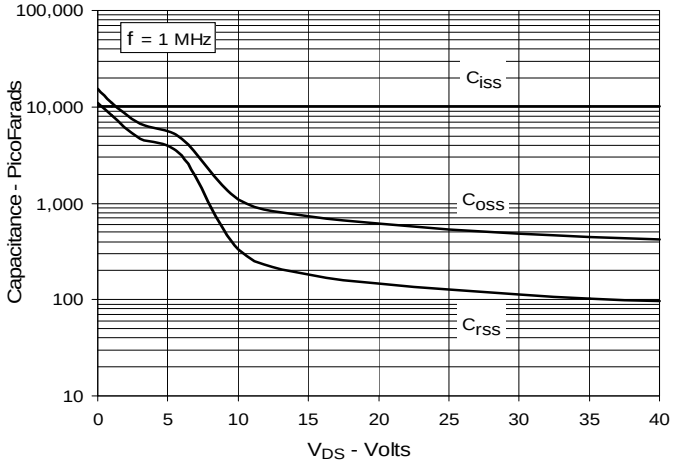


Fig. 12. Maximum Transient Thermal Impedance

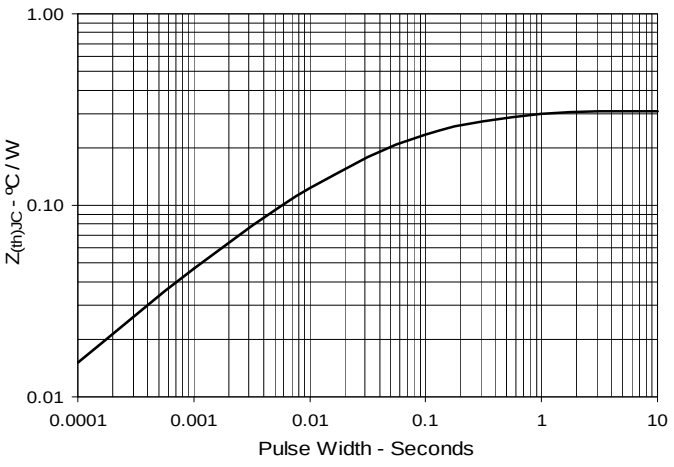


Fig. 13. Forward-Bias Safe Operating Area @ T_C = 25ºC

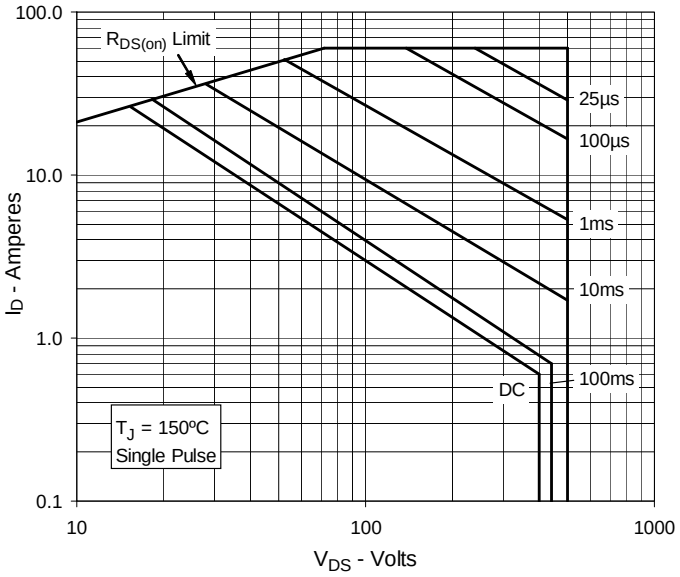


Fig. 14. Forward-Bias Safe Operating Area @ T_C = 75ºC