

Linear Power MOSFET IXTH24N50L

With Extended FBSOA

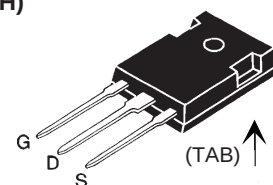
N-Channel Enhancement Mode



$$\begin{aligned} V_{DSS} &= 500 \text{ V} \\ I_{D25} &= 24 \text{ A} \\ R_{DS(on)} &\leq 0.30 \text{ } \Omega \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	$T_J = 25^\circ\text{C}$ to 150°C	500	V
V_{DGR}	$T_J = 25^\circ\text{C}$ to 150°C ; $R_{GS} = 1 \text{ M}\Omega$	500	V
V_{GS}	Continuous	± 30	V
V_{GSM}	Transient	± 40	V
I_{D25}	$T_C = 25^\circ\text{C}$	24	A
I_{DM}	$T_C = 25^\circ\text{C}$, pulse width limited by T_{JM}	50	A
I_{AR}	$T_C = 25^\circ\text{C}$	12	A
E_{AR}	$T_C = 25^\circ\text{C}$	30	mJ
E_{AS}		1.5	J
P_D	$T_C = 25^\circ\text{C}$	400	W
T_J		-55 to +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 to +150	$^\circ\text{C}$
T_L	1.6 mm (0.063 in) from case for 10 s	300	$^\circ\text{C}$
T_{SOLD}	Plastic body for 10 s	260	$^\circ\text{C}$
M_d	Mounting torque	0.9/7.9	Nm/lb.in.
Weight	TO-247	6	g

TO-247 (IXTH)



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

Features

- Designed for linear operation
- International standard package
- Unclamped Inductive switching (UIS) rated
- Molding epoxies meet UL 94 V-0 flammability classification

Applications

- Programmable loads
- Current regulators
- DC-DC converters
- Battery chargers
- DC choppers
- Temperature and lighting controls

Advantages

- Easy to mount
- Space savings
- High power density

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		Min.	Typ.	Max.
BV_{DSS}	$V_{GS} = 0 \text{ V}$, $I_D = 250 \text{ } \mu\text{A}$	500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250 \text{ } \mu\text{A}$	3		V
I_{GSS}	$V_{GS} = \pm 30 \text{ V}$, $V_{DS} = 0 \text{ V}$			$\pm 100 \text{ nA}$
I_{DSS}	$V_{DS} = V_{DSS}$ $V_{GS} = 0 \text{ V}$	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$		50 μA 500 μA
$R_{DS(on)}$	$V_{GS} = 20 \text{ V}$, $I_D = 0.5 I_{D25}$ Note 1			0.30 Ω

Symbol	Test Conditions	Characteristic Values ($T_j = 25^\circ\text{C}$, unless otherwise specified)		
		Min.	Typ.	Max.
g_{fs}	$V_{DS} = 10\text{ V}; I_D = 0.5 \cdot I_{D25}$, Note 1	3	7	11
C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	2500		pF
C_{oss}		400		pF
C_{rss}		100		pF
$t_{d(on)}$	$V_{GS} = 15\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 4.7\ \Omega$ (External),	35		ns
t_r		85		ns
$t_{d(off)}$		110		ns
t_f		75		ns
$Q_{g(on)}$	$V_{GS} = 20\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$	160		nC
Q_{gs}		30		nC
Q_{gd}		50		nC
R_{thJC}		0.31		$^\circ\text{C/W}$
R_{thCS}		0.25		$^\circ\text{C/W}$

Safe Operating Area Specification

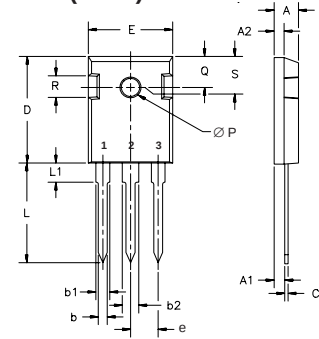
Symbol	Test Conditions	Min.	Typ.	Max.
SOA	$V_{DS} = 400\text{ V}, I_D = 0.5\text{ A}, T_c = 60^\circ\text{C}$	200		W

Source-Drain Diode

Symbol	Test Conditions	Characteristic Values ($T_j = 25^\circ\text{C}$, unless otherwise specified)		
		Min.	Typ.	Max.
I_S	$V_{GS} = 0\text{ V}$			24
I_{SM}	Repetitive; pulse width limited by T_{JM}			96
V_{SD}	$I_F = I_S, V_{GS} = 0\text{ V}$, Note 1			1.5
t_{rr}	$I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$	500		ns

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

TO-247 (IXGH) Outline



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

Dim.	Millimeter		Inches	
	Min.	Max.	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

PRELIMINARY TECHNICAL INFORMATION

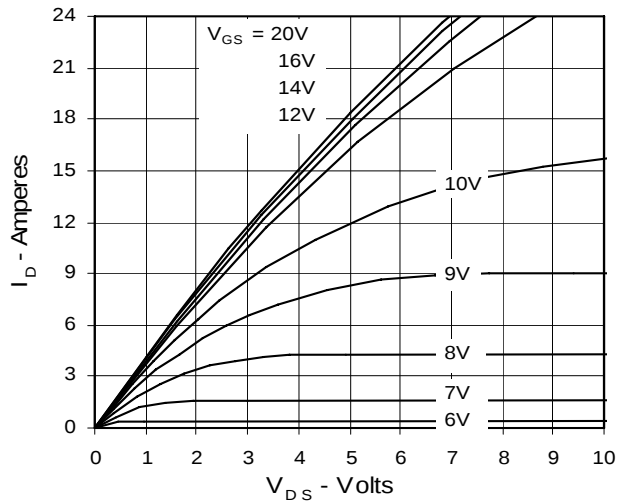
The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right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

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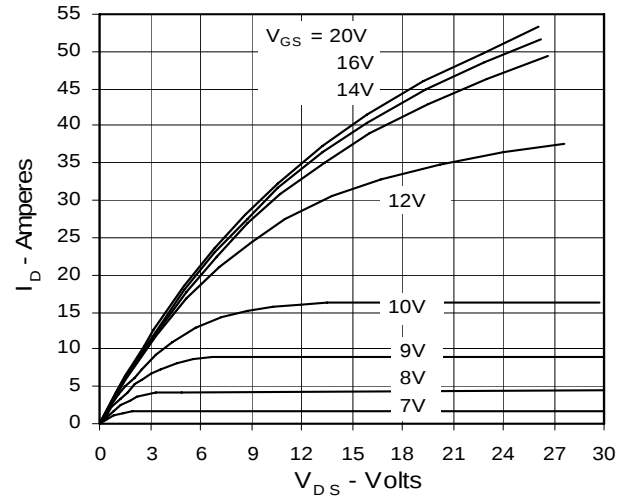
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

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	7,157,338 B2
4,850,072	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	

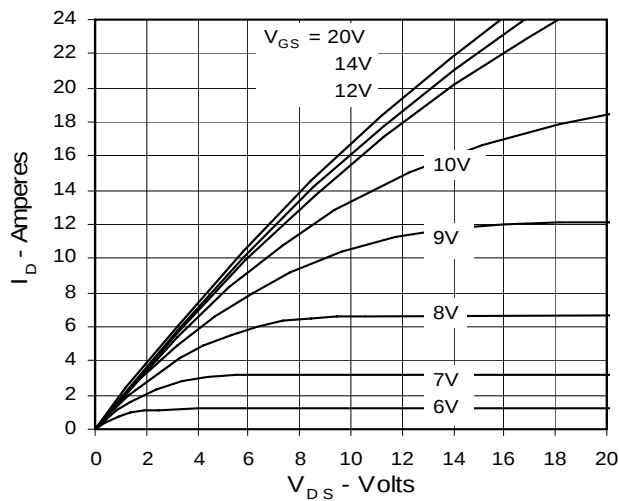
**Fig. 1. Output Characteristics
@ 25°C**



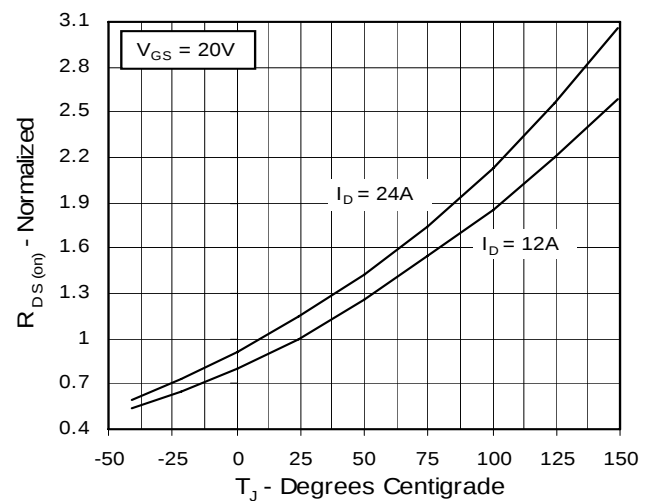
**Fig. 2. Extended Output Characteristics
@ 25°C**



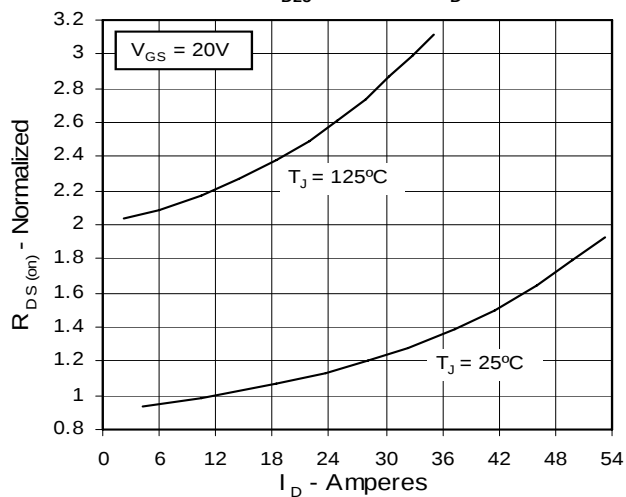
**Fig. 3. Output Characteristics
@ 125°C**



**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**

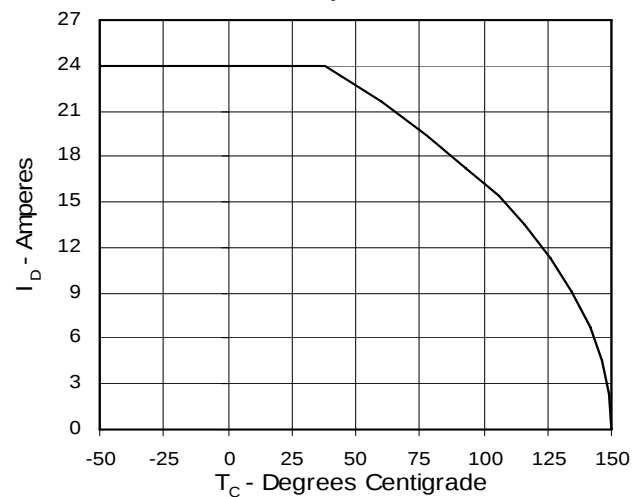


Fig. 7. Input Admittance

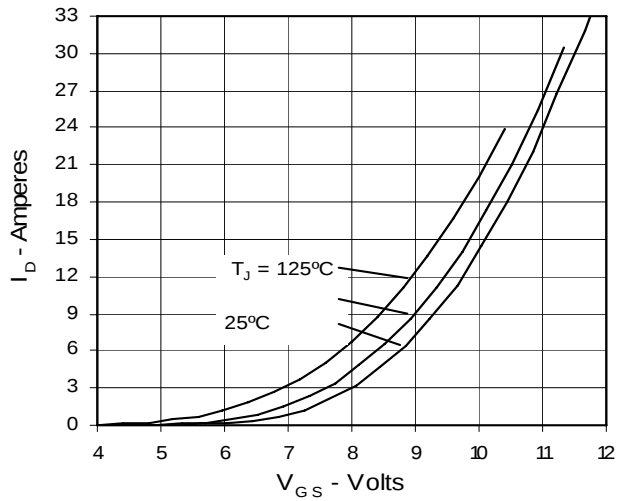


Fig. 8. Transconductance

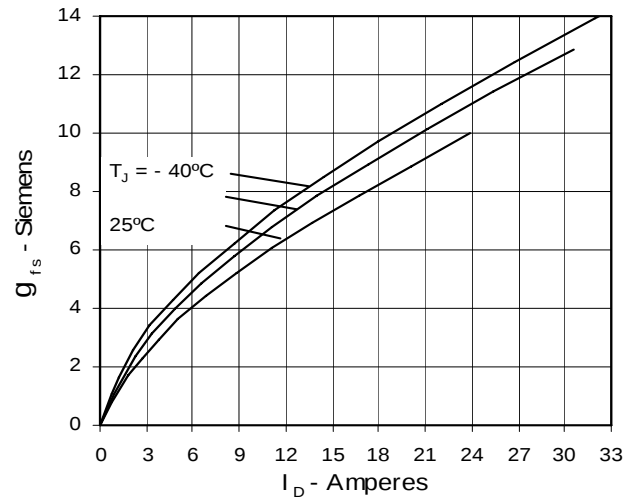


Fig. 9. Source Current vs. Source-To-Drain Voltage

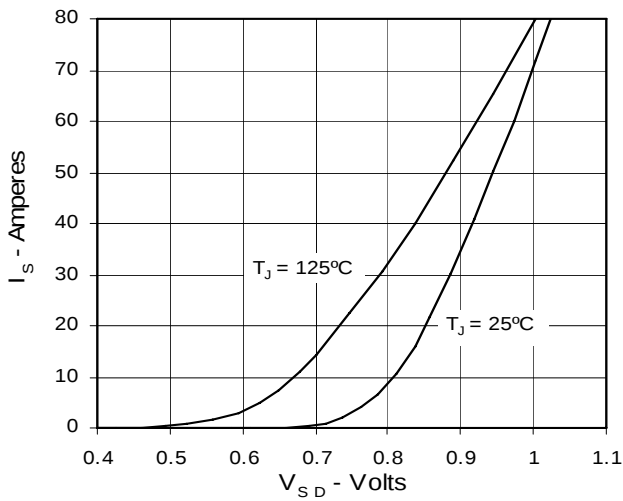


Fig. 10. Gate Charge

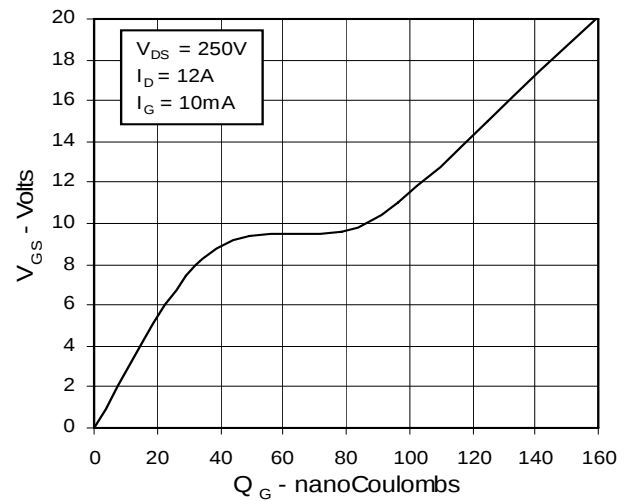


Fig. 11. Capacitance

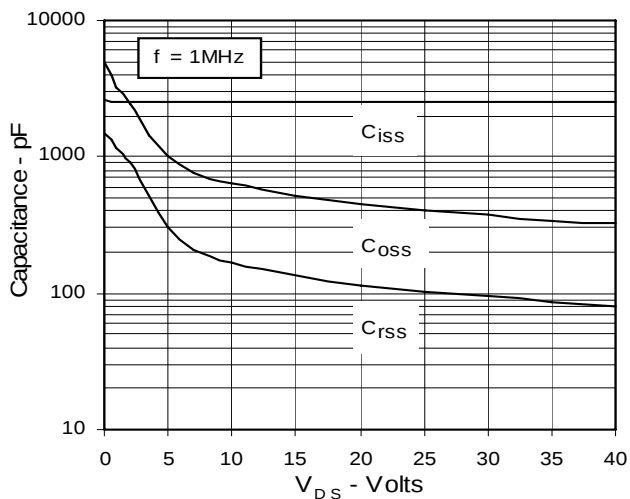


Fig. 12. Forward-Bias Safe Operating Area @ $T_C = 25^\circ\text{C}$

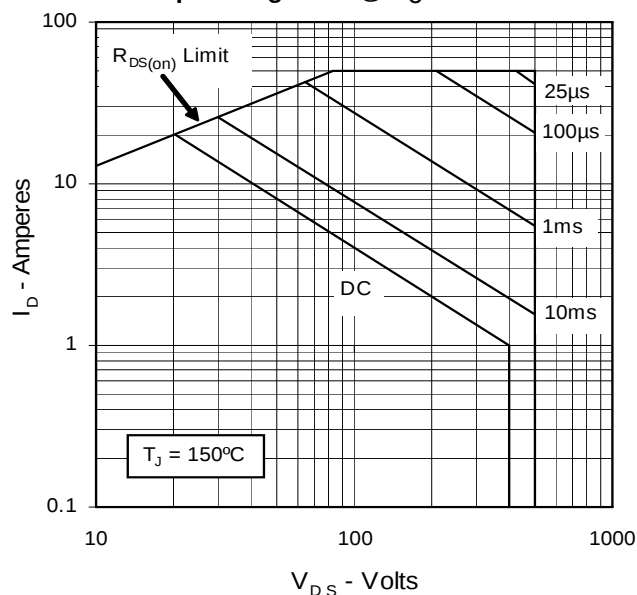


Fig. 13. Forward-Bias Safe Operating Area @ $T_C = 60^\circ\text{C}$

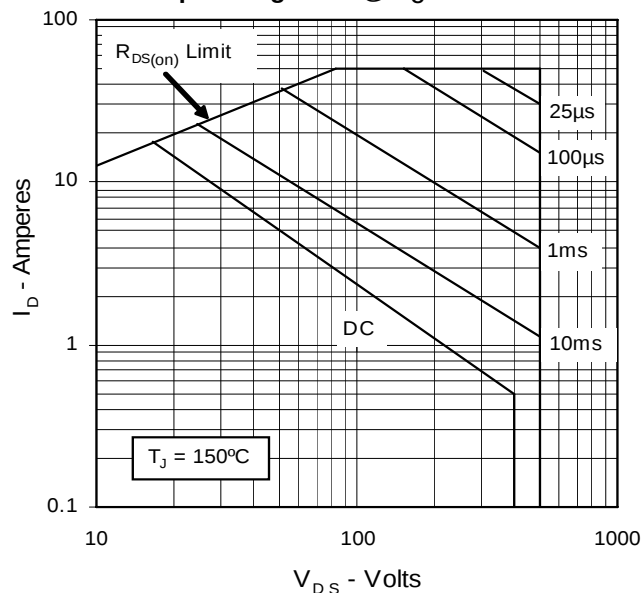
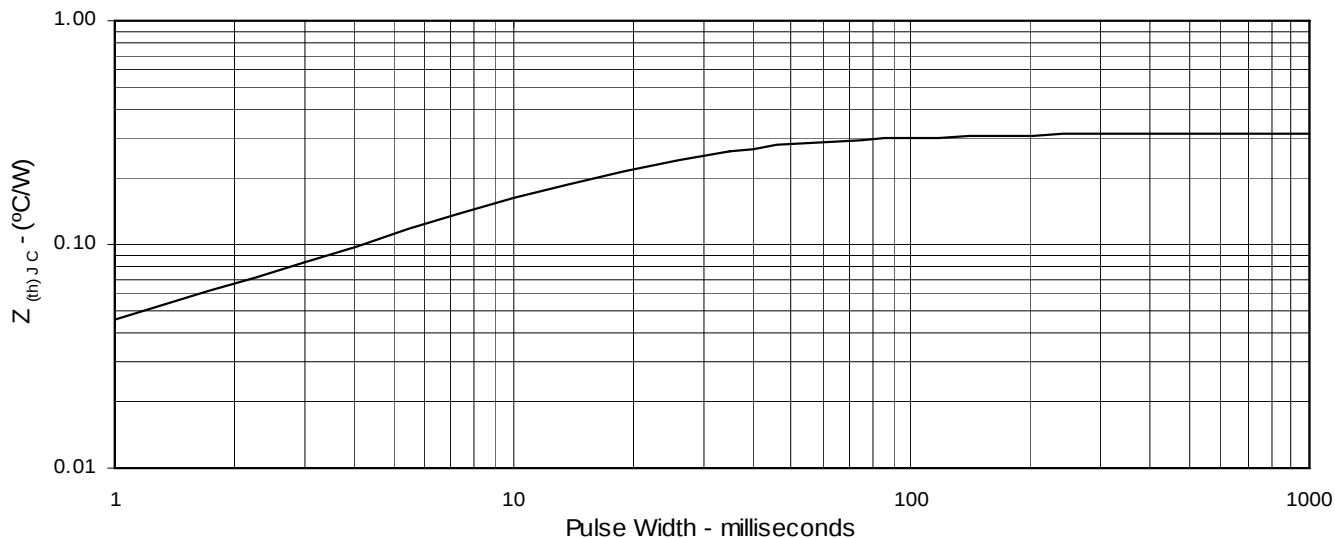


Fig. 14. Maximum Transient Thermal Impedance



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