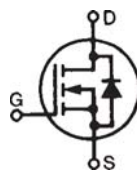


Linear™ Power MOSFET w/ Extended FBSOA

IXTH24N50L

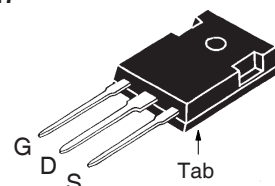
N-Channel Enhancement Mode
Avalanche Rated



$$\begin{aligned} V_{DSS} &= 500V \\ I_{D25} &= 24A \\ R_{DS(on)} &\leq 300m\Omega \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	500	V
V_{DGR}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}, R_{GS} = 1M\Omega$	500	V
V_{GSS}	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_A	$T_C = 25^\circ\text{C}$	12	A
E_{AS}	$T_C = 25^\circ\text{C}$	1.5	J
P_D	$T_C = 25^\circ\text{C}$	400	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
T_L	1.6mm (0.062in.) from Case for 10s	300	$^\circ\text{C}$
T_{sold}	Plastic Body for 10 seconds	260	$^\circ\text{C}$
M_d	Mounting Torque	1.13 / 10	Nm/lb.in.
Weight		6	g

TO-247



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

Features

- Designed for Linear Operation
- International Standard Package
- Avalanche Rated
- Molding Epoxy Meets UL94 V-0 Flammability Classification

Advantages

- Easy to Mount
- Space Savings
- High Power Density

Applications

- Programmable Loads
- Current Regulators
- DC-DC Converters
- Battery Chargers
- DC Choppers
- Temperature and Lighting Controls

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.5		6.0 V
I_{GSS}	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 100 nA
I_{DSS}	$V_{DS} = V_{DSS}, V_{GS} = 0V$ $T_J = 125^\circ\text{C}$			50 μA 500 μA
$R_{DS(on)}$	$V_{GS} = 20V, I_D = 0.5 \cdot I_{D25}$, Note 1			300 m Ω

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$V_{DS} = 20\text{V}$, $I_D = 0.5 \cdot I_{D25}$, Note 1	3	7	11 S
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
$t_{d(on)}$	Resistive Switching Times $V_{GS} = 15\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ $R_G = 4.7\Omega$ (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}		0.21	0.31 $^\circ\text{C/W}$	
R_{thCS}			$^\circ\text{C/W}$	

Safe-Operating-Area Specification

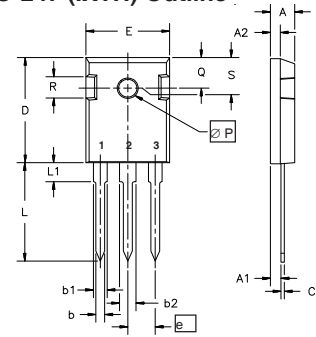
Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
SOA	$V_{DS} = 400\text{V}$, $I_D = 0.5\text{A}$, $T_C = 60^\circ\text{C}$	200		W

Source-Drain Diode

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
I_S	$V_{GS} = 0\text{V}$			24 A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			96 A
V_{SD}	$I_F = I_S$, $V_{GS} = 0\text{V}$, Note 1			1.5 V
t_{rr}	$I_F = I_S$, $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$, $V_{GS} = 0\text{V}$		500	ns

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

TO-247 (IXTH) Outline



Terminals: 1 - Gate 2 - Drain
3 - Source

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

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	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2	7,157,338B2
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
@ $T_J = 25^\circ\text{C}$

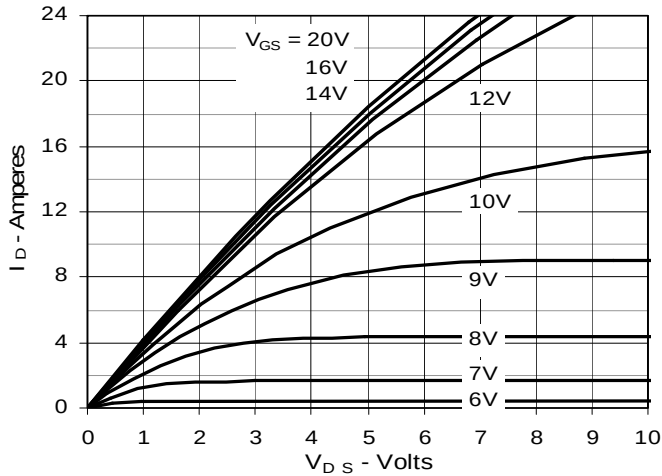


Fig. 2. Extended Output Characteristics
@ $T_J = 25^\circ\text{C}$

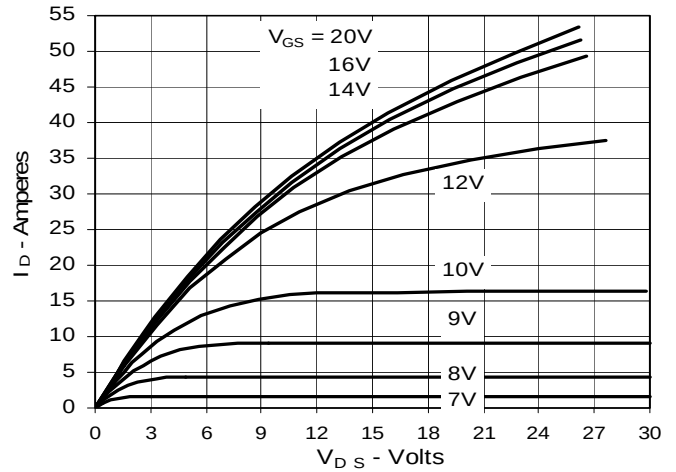


Fig. 3. Output Characteristics
@ $T_J = 125^\circ\text{C}$

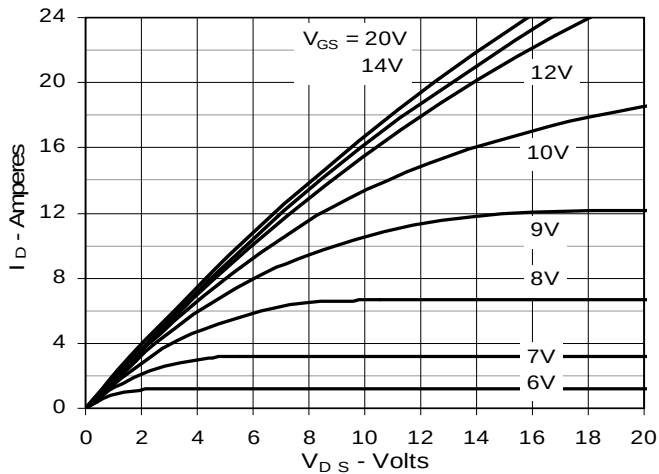


Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. Junction Temperature

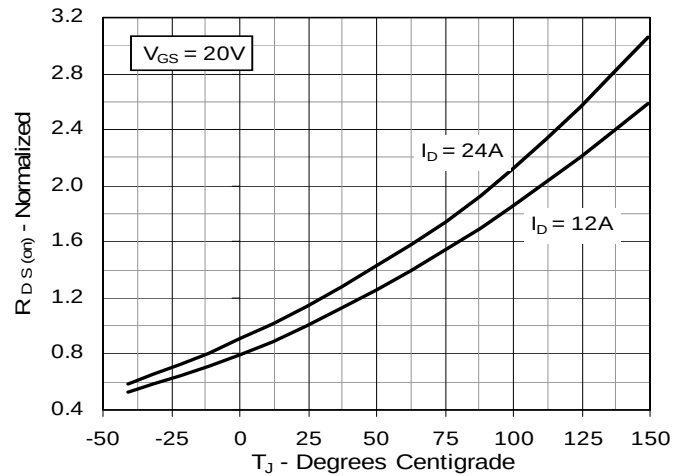


Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. I_D

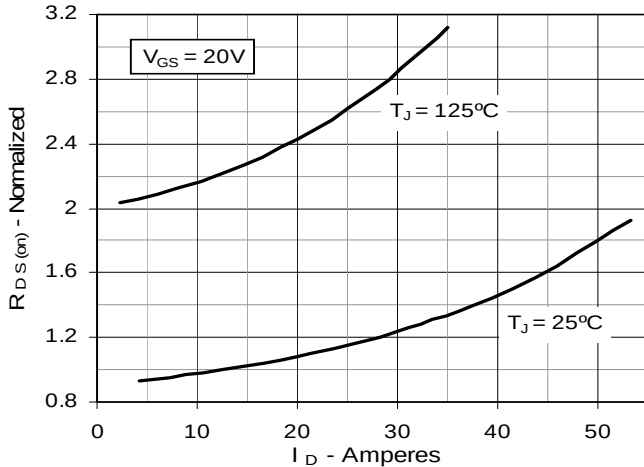


Fig. 6. Drain Current vs. Case Temperature

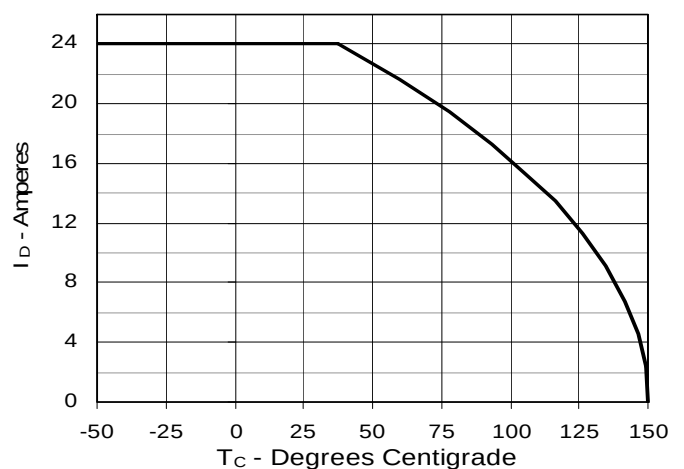
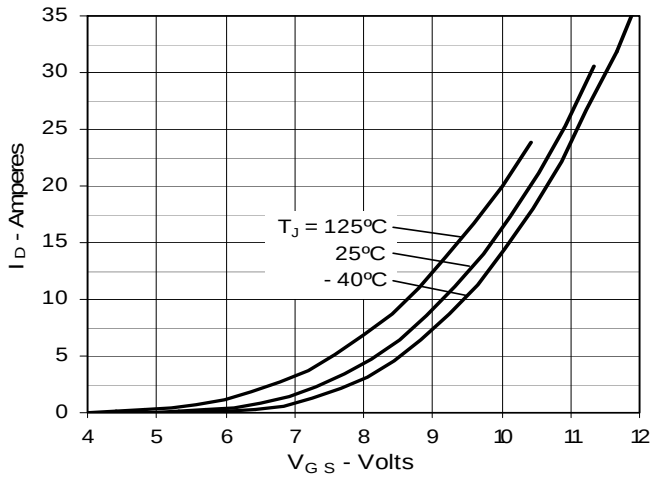
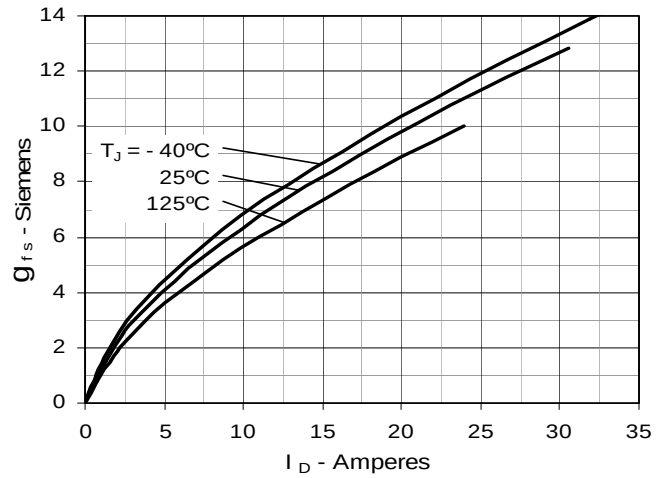
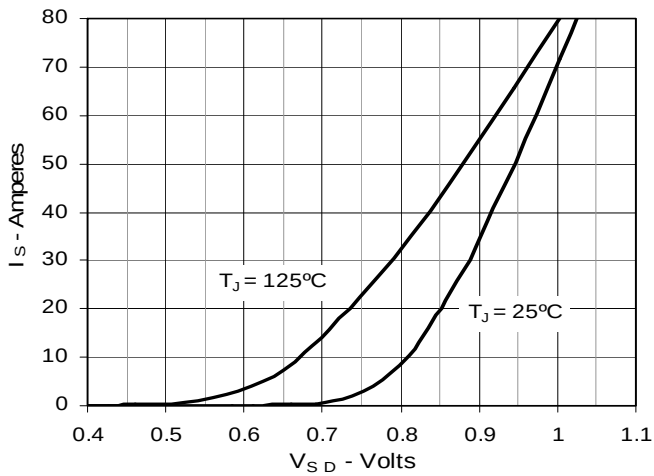
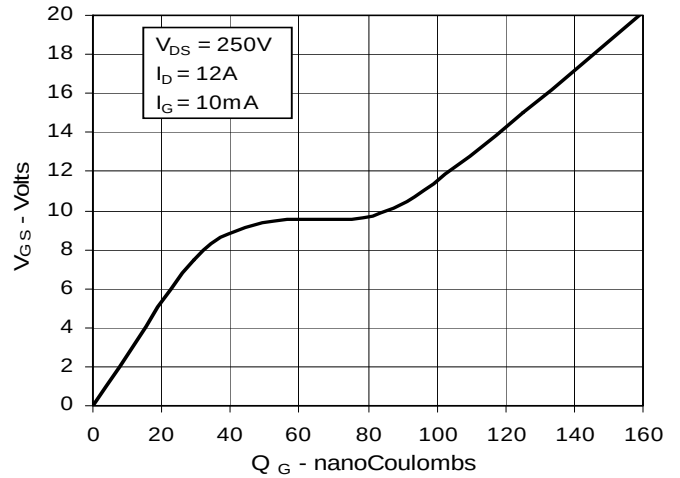
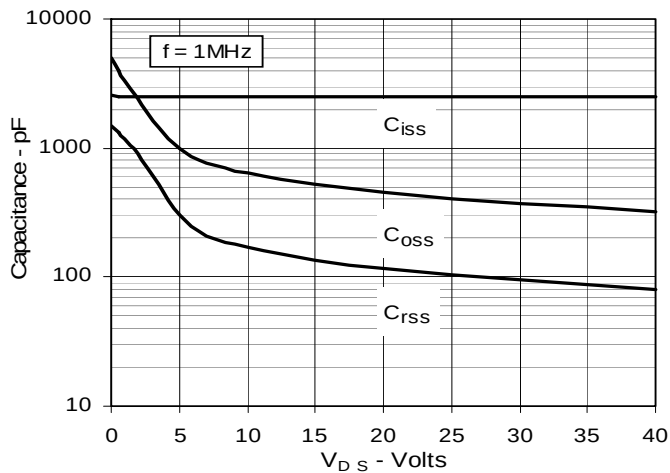
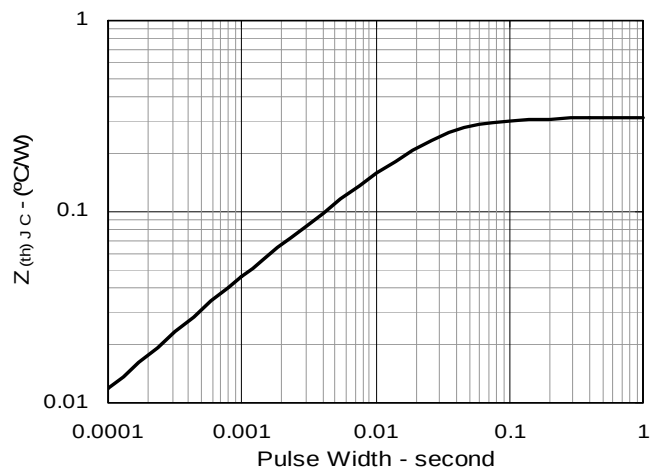
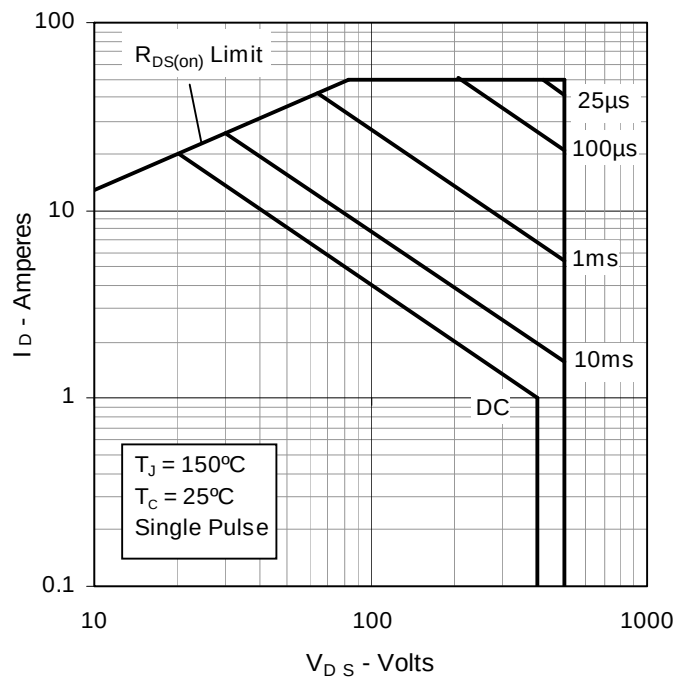
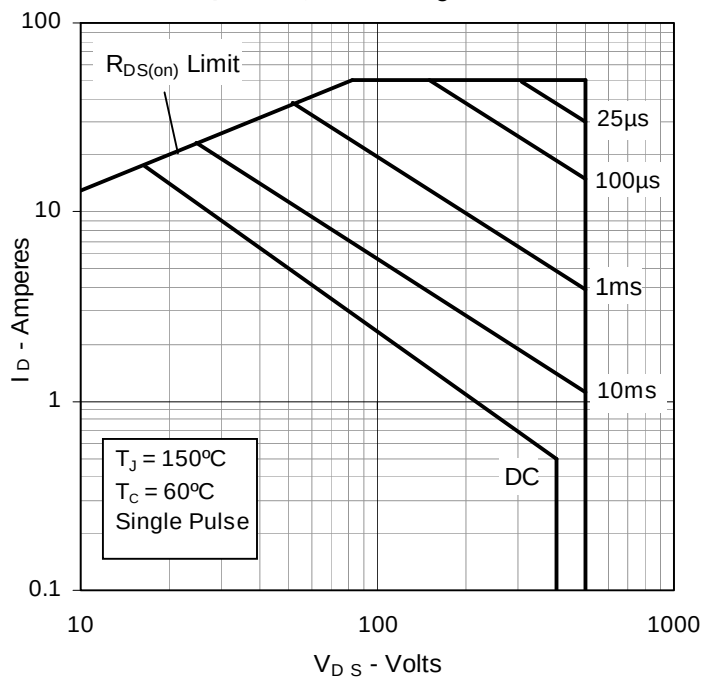


Fig. 7. Input Admittance

Fig. 8. Transconductance

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

Fig. 10. Gate Charge

Fig. 11. Capacitance

Fig. 12. Maximum Transient Thermal Impedance


**Fig. 13. Forward-Bias Safe
Operating Area @ $T_C = 25^\circ\text{C}$**



**Fig. 14. Forward-Bias Safe
Operating Area @ $T_C = 60^\circ\text{C}$**





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