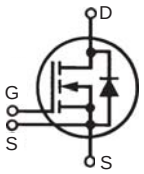
Linear Power MOSFET With Extended FBSOA

IXTN46N50L

N-Channel Enhancement Mode

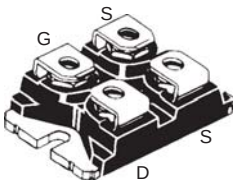
V_{DSS} = 500 V
I_{D25} = 46 A
$R_{DS(on)}$ ≤ 0.16 Ω



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} = 1 MΩ		500	V
V_{GS}	Continuous		±30	V
V_{GSM}	Transient		±40	V
I_{D25}	T_C = 25°C		46	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}		100	A
I_{AR}	T_C = 25°C		46	A
E_{AR}	T_C = 25°C		60	mJ
E_{AS}	T_C = 25°C		1.5	J
P_D	T_C = 25°C		700	W
T_J			-55 to +150	°C
T_{JM}			150	°C
T_{stg}			-55 to +150	°C
V_{ISOL}	50/60 Hz, RMS,	T = 1 min	2500	V~
	I_{ISOL} ≤ 1 mA,	T = 1 s	3000	V~
M_d	Mounting torque for Base Plate		1.5/13	Nm/lb.in.
	Terminal connection torque		1.3/11.5	Nm/lb.in.
Weight			30	g

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0 V, I_D = 1 mA		500			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA		3		6	V
I_{GSS}	V_{GS} = ±30 V, V_{DS} = 0 V				±200	nA
I_{DSS}	V_{DS} = V_{DSS}	T_J = 25°C			50	μA
	V_{GS} = 0 V	T_J = 125°C			1	mA
$R_{DS(on)}$	V_{GS} = 20 V, I_D = 0.5 I_{D25} Note 1				0.16	Ω

miniBLOC, SOT-227 B (IXTN)
E153432



G = Gate D = Drain
S = Source

Either Source terminal S can be used as the Source terminal or the Kelvin Source (gate return) terminal.

Features
- Designed for linear operation
- International standard package
- Molding epoxy meets UL94 V-0 flammability classification
- miniBLOC with Aluminium nitride isolation

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 (T$_J$ = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 10 V; I_D = 0.5 • I_{D25}, Note 1	7	10	13	S
C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		7000		pF
C_{oss}			900		pF
C_{rss}			170		pF
$t_{d(on)}$	V_{GS} = 15 V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25} R_G = 2 Ω (External),		40		ns
t_r			50		ns
$t_{d(off)}$			80		ns
t_f			42		ns
$Q_{g(on)}$	V_{GS} = 15 V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		260		nC
Q_{gs}			85		nC
Q_{gd}			125		nC
R_{thJC}				0.18	°C/W
R_{thCS}			0.05		°C/W

Safe Operating Area Specification

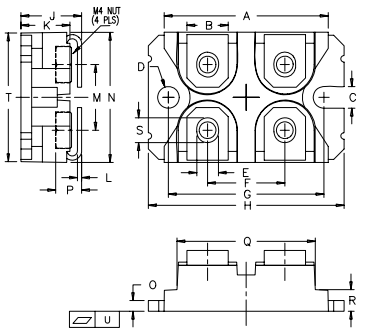
Symbol	Test Conditions	Min.	Typ.	Max.	
SOA	V_{DS} = 400 V, I_D = 0.6 A, T_C = 90°C	240			W

Source-Drain Diode

Symbol	Test Conditions (T$_J$ = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
I_S	V_{GS} = 0 V			46	A
I_{SM}	Repetitive; pulse width limited by T_{JM}			100	A
V_{SD}	I_F = I_S, V_{GS} = 0 V, Note 1			1.5	V
t_{rr}	I_F = I_S, -dt/dt = 100 A/µs, V_R = 100 V		600		ns

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

SOT-227B (IXTN) Outline



(M4 screws (4x) supplied)

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	1.240	1.255	31.50	31.88
B	.307	.323	7.80	8.20
C	.161	.169	4.09	4.29
D	.161	.169	4.09	4.29
E	.161	.169	4.09	4.29
F	.587	.595	14.91	15.11
G	1.186	1.193	30.12	30.30
H	1.496	1.505	38.00	38.23
J	.460	.481	11.68	12.22
K	.351	.378	8.92	9.60
L	.030	.033	0.76	0.84
M	.496	.506	12.60	12.85
N	.990	1.001	25.15	25.42
O	.078	.084	1.98	2.13
P	.195	.235	4.95	5.97
Q	1.045	1.059	26.54	26.90
R	.155	.174	3.94	4.42
S	.186	.191	4.72	4.85
T	.968	.987	24.59	25.07
U	-.002	.004	-0.05	0.1

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.

Fig. 1. Output Characteristics @ 25ºC

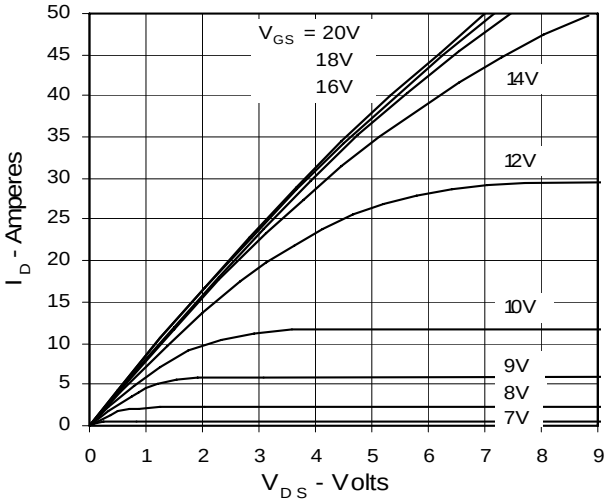


Fig. 2. Extended Output Characteristics @ 25ºC

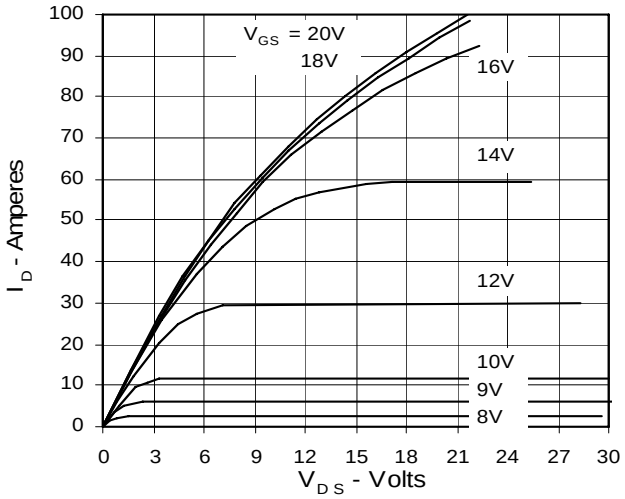


Fig. 3. Output Characteristics @ 125ºC

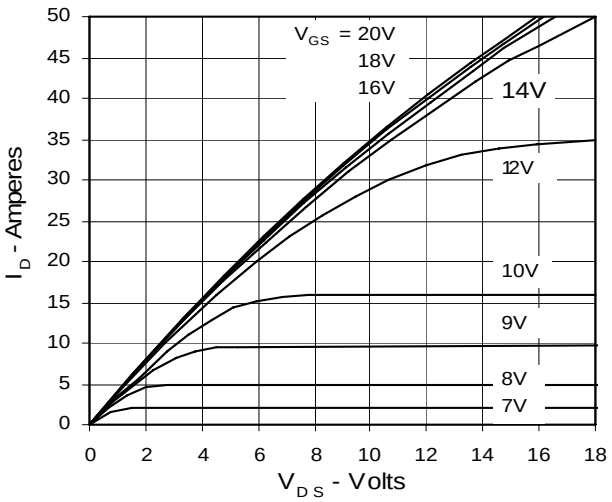


Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. Junction Temperature

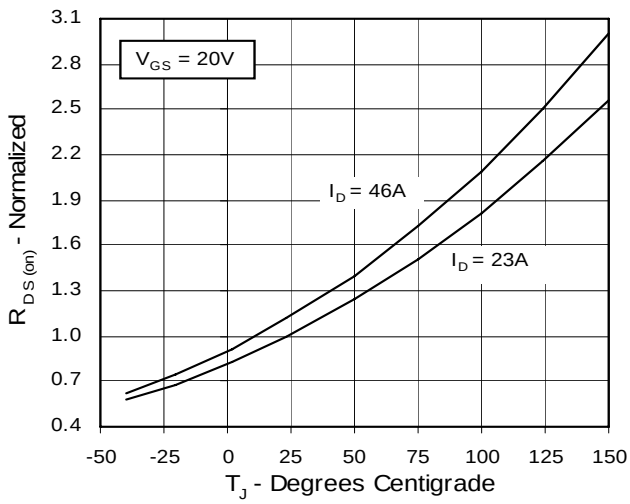


Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. I_D

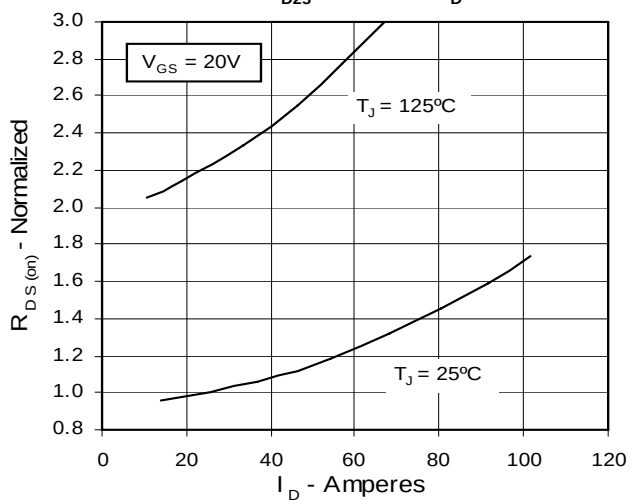


Fig. 6. Drain Current vs. Case Temperature

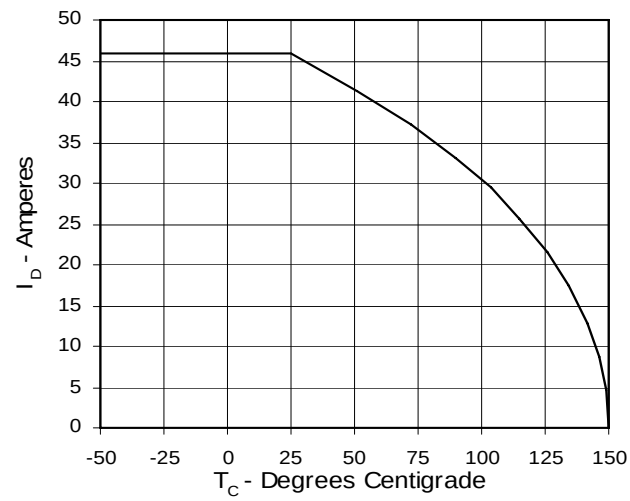


Fig. 7. Input Admittance

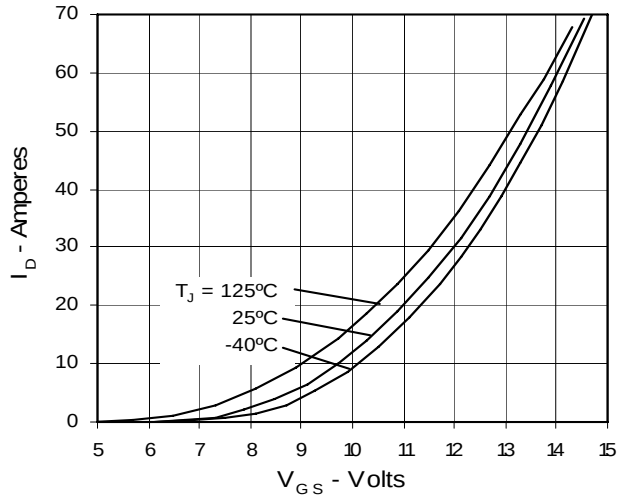


Fig. 8. Transconductance

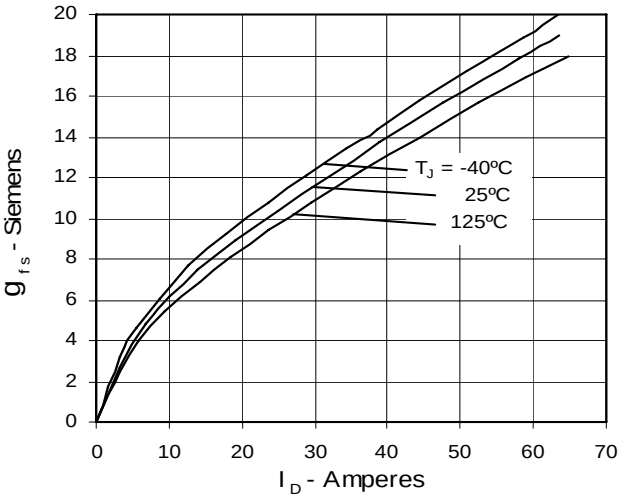


Fig. 9. Source Current vs. Source-To-Drain Voltage

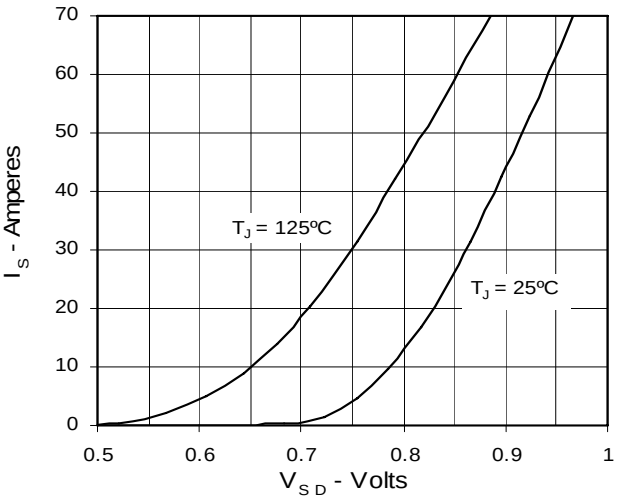


Fig. 10. Gate Charge

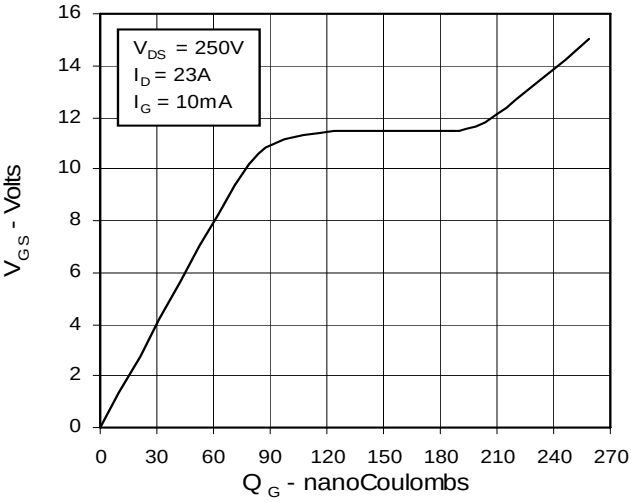


Fig. 11. Capacitance

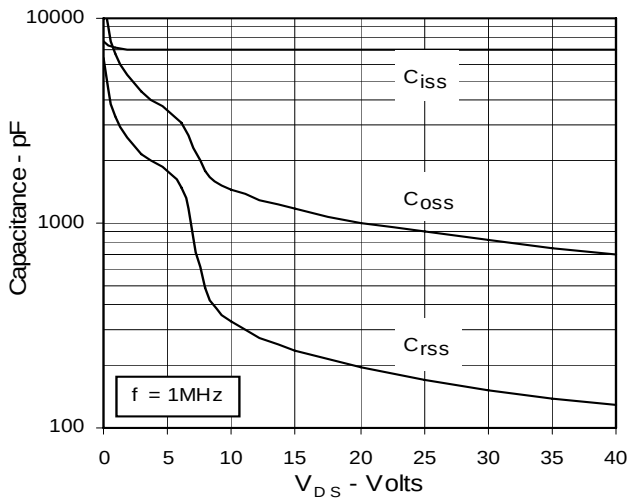


Fig. 12. Forward-Bias Safe Operating Area @ T_C = 25ºC

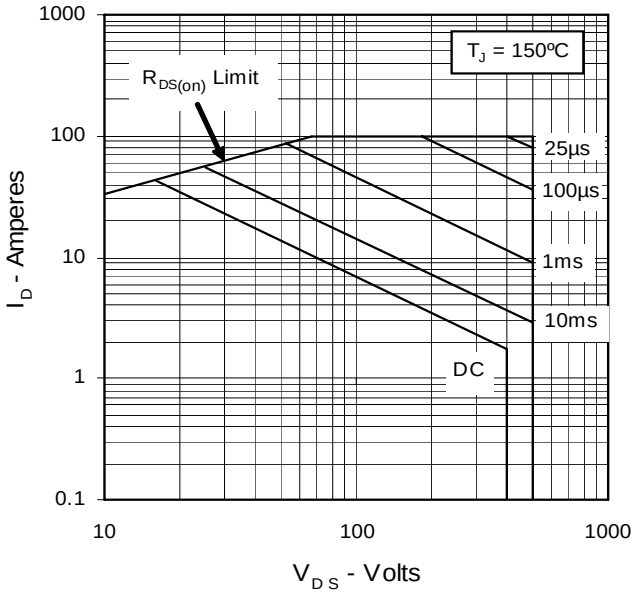


Fig. 13. Forward-Bias Safe Operating Area @ T_C = 90ºC

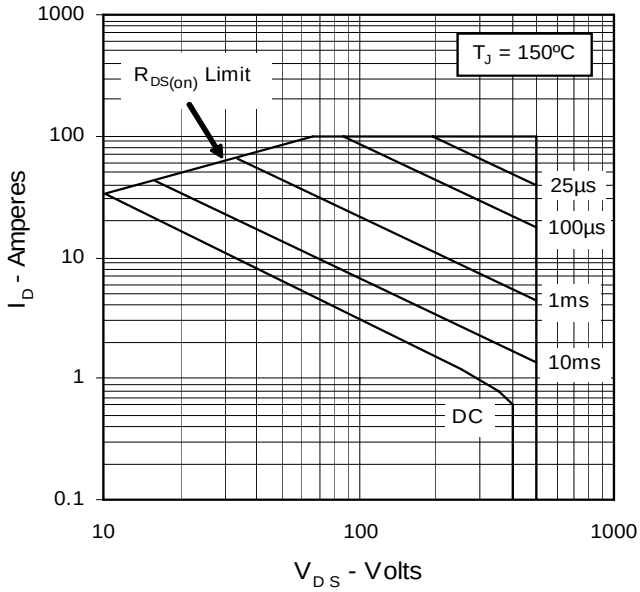


Fig. 14. Maximum Transient Thermal Impedance