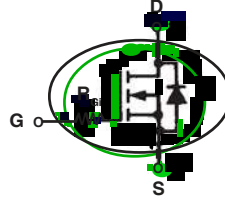


# Linear L2™ Power MOSFET with extended FBSOA

N-Channel Enhancement Mode

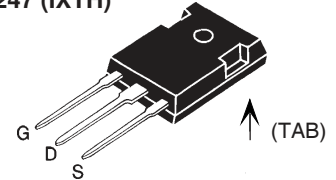
**IXTH30N50L2**  
**IXTQ30N50L2**  
**IXTT30N50L2**

**V<sub>DSS</sub> = 500V**  
**I<sub>D25</sub> = 30A**  
**R<sub>DS(on)</sub> ≤ 200mΩ**

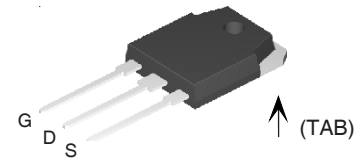


Symbol	Test Conditions	Maximum Ratings	
V <sub>DSS</sub>	T <sub>J</sub> = 25°C to 150°C	500	V
V <sub>DGR</sub>	T <sub>J</sub> = 25°C to 150°C, R <sub>GS</sub> = 1MΩ	•500	V
V <sub>GSS</sub>	Continuous	±20	V
V <sub>GSM</sub>	Transient	±30	V
I <sub>D25</sub>	T <sub>C</sub> = 25°C	30	A
I <sub>DM</sub>	T <sub>C</sub> = 25°C, pulse width limited by T <sub>JM</sub>	60	A
I <sub>AR</sub>	T <sub>C</sub> = 25°C	30	A
E <sub>AR</sub>	T <sub>C</sub> = 25°C	50	mJ
E <sub>AS</sub>		1.5	J
P <sub>D</sub>	T <sub>C</sub> = 25°C	400	W
T <sub>J</sub>		-55 to +150	°C
T <sub>JM</sub>		+150	°C
T <sub>stg</sub>		-55 to +150	°C
T <sub>L</sub>	1.6mm (0.063in) from case for 10s	300	°C
T <sub>SOLD</sub>	Plastic body for 10s	260	°C
M <sub>d</sub>	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

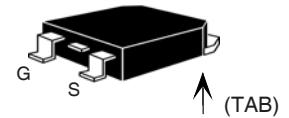
TO-247 (IXTH)



TO-3P (IXTQ)



TO-268 (IXTT)



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

## 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	Characteristic Values		
		Min.	Typ.	Max.
(T <sub>J</sub> = 25°C, unless otherwise specified)				
BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	500		V
V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2.5		4.5 V
I <sub>GSS</sub>	V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V			±100 nA
I <sub>DSS</sub>	V <sub>DS</sub> = V <sub>DSS</sub>			50 μA
	V <sub>GS</sub> = 0V      T <sub>J</sub> = 125°C			300 μA
R <sub>DS(on)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 0.5 • I <sub>D25</sub> , Note 1			200 mΩ

Symbol	Test Conditions	Characteristic Values			
		Min.	Typ.	Max.	
$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$					
$g_{fs}$	$V_{DS} = 10\text{V}, I_D = 0.5 \cdot I_{D25}, \text{ Note 1}$	9	12	15	S
$C_{iss}$	$V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$		8100		pF
$C_{oss}$			530		pF
$C_{rss}$			115		pF
$R_{Gi}$	Integrated gate input resistor		3.5		$\Omega$
$t_{d(on)}$	<b>Resistive Switching Times</b> $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 0\Omega \text{ (External)}$		35		ns
$t_r$			117		ns
$t_{d(off)}$			94		ns
$t_f$			40		ns
$Q_{g(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$		240		nC
$Q_{gs}$			58		nC
$Q_{gd}$			135		nC
$R_{thJC}$				0.31	$^\circ\text{C/W}$
$R_{thCS}$	(TO-247, TO-3P)		0.25		$^\circ\text{C/W}$

### Safe Operating Area Specification

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

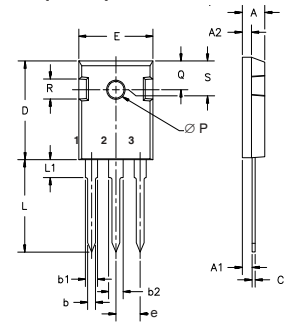
### Source-Drain Diode

Characteristic Values  
( $T_J = 25^\circ\text{C}, \text{ unless otherwise specified}$ )

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

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

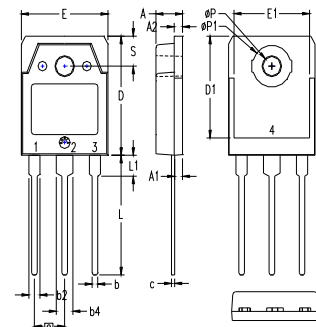
### TO-247 (IXTH) Outline



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

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A <sub>1</sub>	2.2	2.54	.087	.102
A <sub>2</sub>	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b <sub>1</sub>	1.65	2.13	.065	.084
b <sub>2</sub>	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
L <sub>1</sub>		4.50		.177
$\varnothing P$	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	

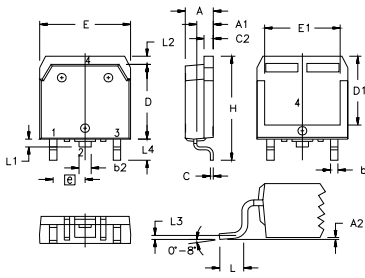
### TO-3P (IXTQ) Outline



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

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.193	4.70	4.90
A <sub>1</sub>	.051	.059	1.30	1.50
A <sub>2</sub>	.057	.065	1.45	1.65
b	.035	.045	0.90	1.15
b <sub>2</sub>	.075	.087	1.90	2.20
b <sub>4</sub>	.114	.126	2.90	3.20
c	.022	.031	0.55	0.80
D	.780	.799	19.80	20.30
D <sub>1</sub>	.665	.677	16.90	17.20
E	.610	.622	15.50	15.80
E <sub>1</sub>	.531	.539	13.50	13.70
e		.215 BSC		5.45 BSC
L	.779	.795	19.80	20.20
L <sub>1</sub>	.134	.142	3.40	3.60
$\varnothing P$	.126	.134	3.20	3.40
$\varnothing P1$	.272	.280	6.90	7.10
S	.193	.201	4.90	5.10

### TO-268 (IXTT) Outline

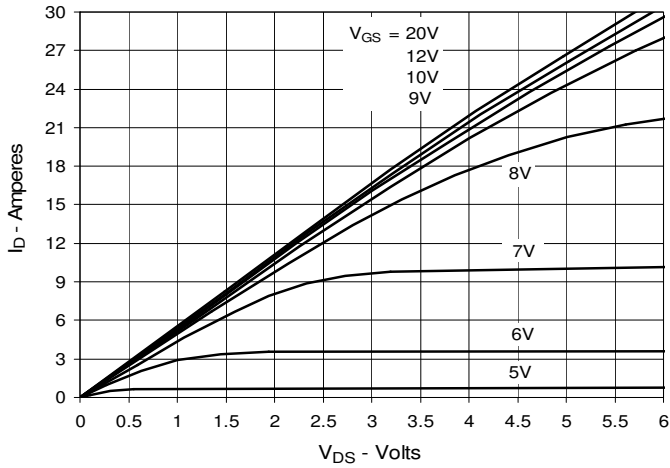


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A <sub>1</sub>	.106	.114	2.70	2.90
A <sub>2</sub>	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b <sub>2</sub>	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C <sub>2</sub>	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D <sub>1</sub>	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E <sub>1</sub>	.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
L <sub>1</sub>	.047	.055	1.20	1.40
L <sub>2</sub>	.039	.045	1.00	1.15
L <sub>3</sub>		.010 BSC		0.25 BSC
L <sub>4</sub>	.150	.161	3.80	4.10

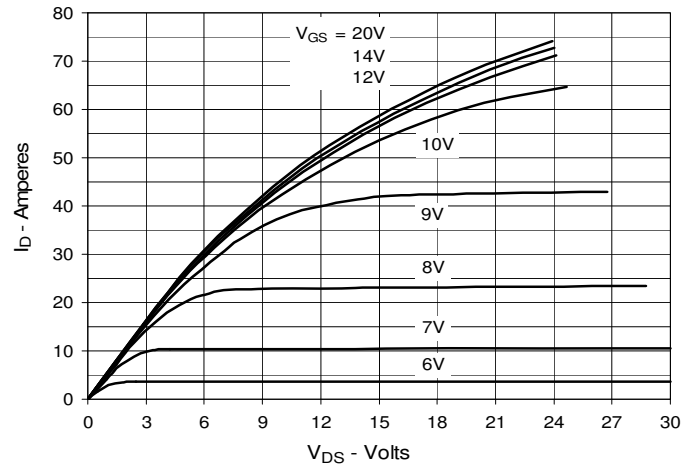
IXYS reserves the right to change limits, test conditions, and dimensions.

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

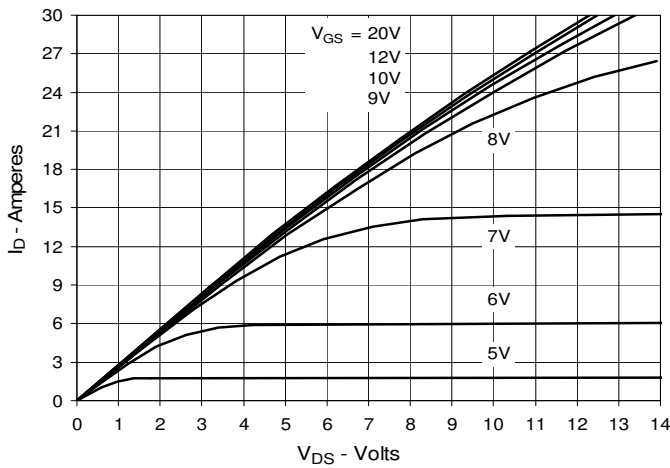
**Fig. 1. Output Characteristics**  
@  $T_J = 25^\circ\text{C}$



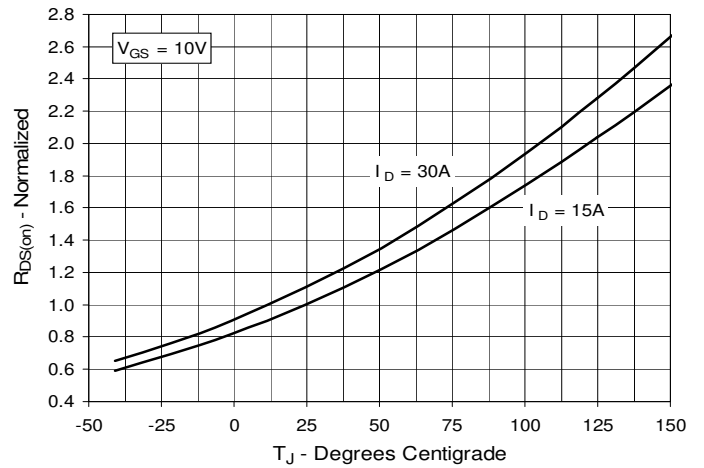
**Fig. 2. Extended Output Characteristics**  
@  $T_J = 25^\circ\text{C}$



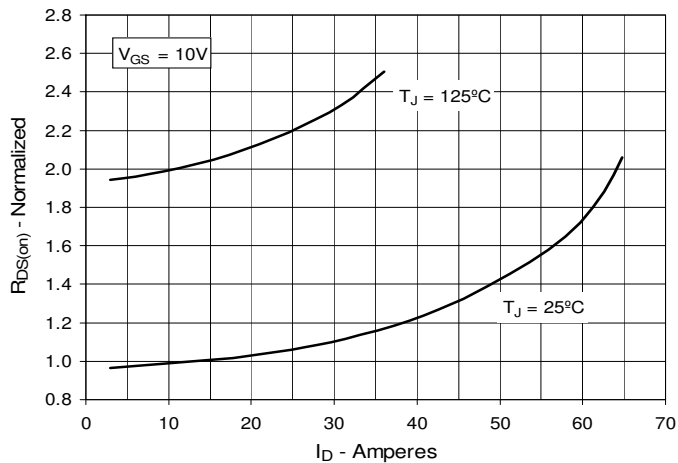
**Fig. 3. Output Characteristics**  
@  $T_J = 125^\circ\text{C}$



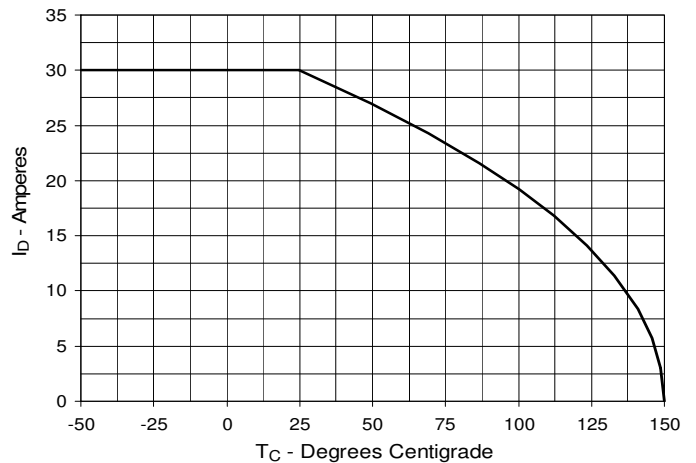
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 15\text{A}$  Value vs. Junction Temperature**



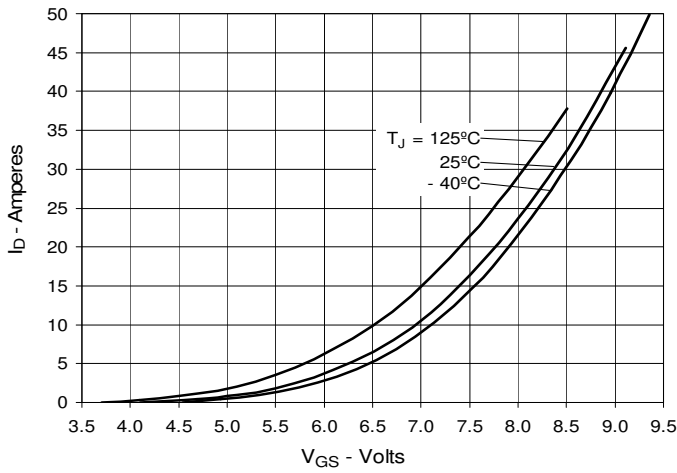
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 15\text{A}$  Value vs. Drain Current**



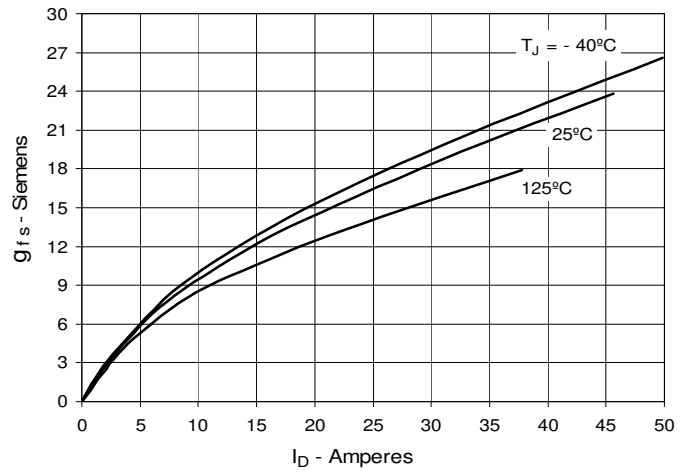
**Fig. 6. Maximum Drain Current vs. Case Temperature**



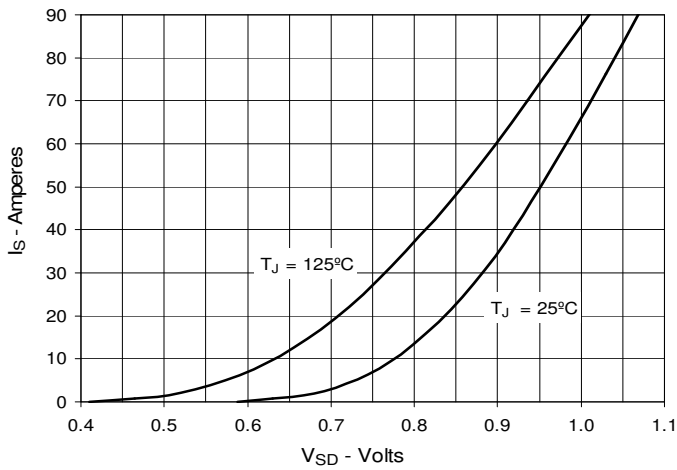
**Fig. 7. Input Admittance**



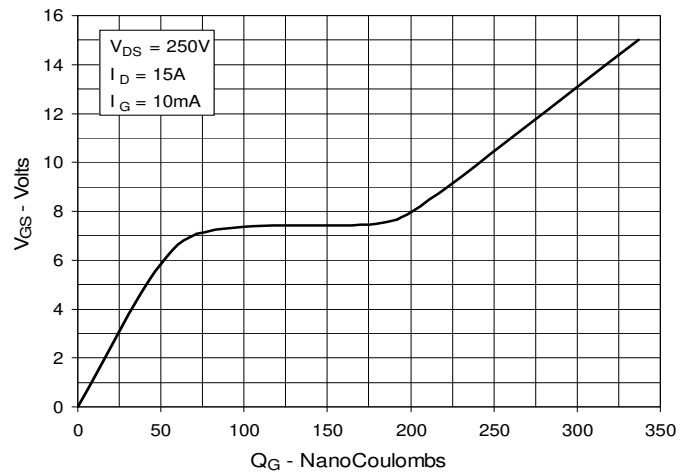
**Fig. 8. Transconductance**



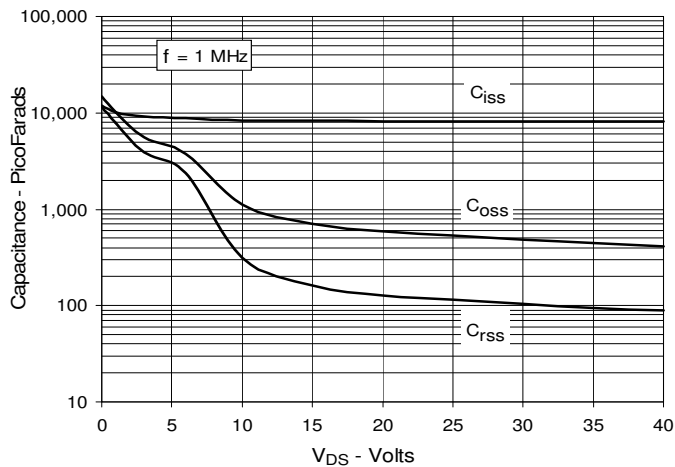
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



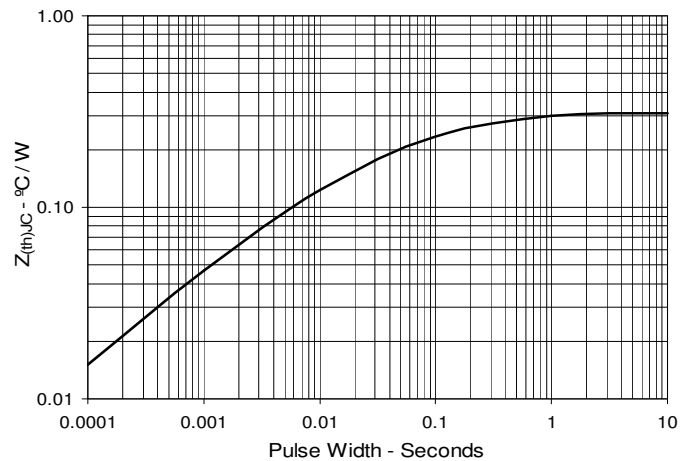
**Fig. 10. Gate Charge**



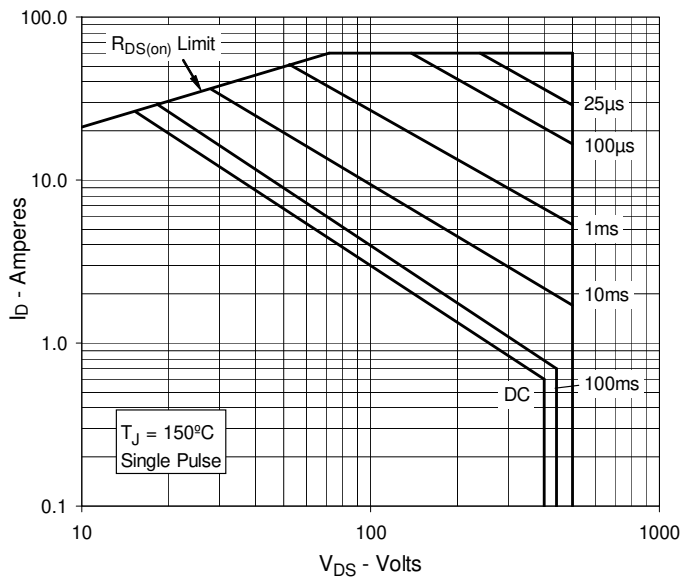
**Fig. 11. Capacitance**



**Fig. 12. Maximum Transient Thermal Impedance**



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



**Fig. 14. Forward-Bias Safe Operating Area**  
@  $T_C = 75^\circ\text{C}$

