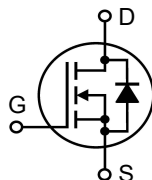


# X4-Class Power MOSFET™

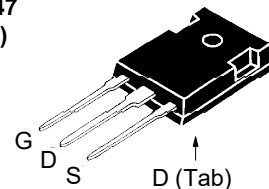
## IXTH94N20X4

$V_{DSS} = 200V$   
 $I_{D25} = 94A$   
 $R_{DS(on)} \leq 10.6m\Omega$

N-Channel Enhancement Mode  
Avalanche Rated



TO-247  
(IXTH)



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

Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ C$ to $175^\circ C$	200	V
$V_{DGR}$	$T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$	200	V
$V_{GSS}$	Continuous	$\pm 20$	V
$V_{GSM}$	Transient	$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ C$	94	A
$I_{DM}$	$T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$	220	A
$I_A$	$T_C = 25^\circ C$	47	A
$E_{AS}$	$T_C = 25^\circ C$	1	J
$dv/dt$	$I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$	20	V/ns
$P_D$	$T_C = 25^\circ C$	360	W
$T_J$		-55 ... +175	$^\circ C$
$T_{JM}$		175	$^\circ C$
$T_{stg}$		-55 ... +175	$^\circ C$
$T_L$	Maximum Lead Temperature for Soldering 1.6 mm (0.062 in.) from Case for 10s	300	$^\circ C$
$M_d$	Mounting Torque	1.13 / 10	Nm/lb.in
<b>Weight</b>		6	g

### Features

- International Standard Package
- Low  $R_{DS(ON)}$  and  $Q_G$
- Avalanche Rated
- Low Package Inductance

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

Symbol	Test Conditions ( $T_J = 25^\circ C$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0V$ , $I_D = 250\mu A$	200		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\mu A$	2.5		4.5 V
$I_{GSS}$	$V_{GS} = \pm 20V$ , $V_{DS} = 0V$			$\pm 100$ nA
$I_{DSS}$	$V_{DS} = V_{DSS}$ , $V_{GS} = 0V$ $T_J = 150^\circ C$			20 $\mu A$ 500 $\mu A$
$R_{DS(on)}$	$V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1			10.6 m $\Omega$

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max
$g_{fs}$	$V_{DS} = 10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1	60	100	S
$R_{Gi}$	Gate Input Resistance		5.3	$\Omega$
$C_{iss}$	} $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$		5050	pF
$C_{oss}$			750	pF
$C_{rss}$			4	pF
<b>Effective Output Capacitance</b>				
$C_{o(er)}$	Energy related } $V_{GS} = 0\text{V}$		390	pF
$C_{o(tr)}$	Time related } $V_{DS} = 0.8 \cdot V_{DSS}$		1670	pF
$t_{d(on)}$	} <b>Resistive Switching Times</b> $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$ $R_G = 5\Omega$ (External)		18	ns
$t_r$			9	ns
$t_{d(off)}$			97	ns
$t_f$			7	ns
$Q_{g(on)}$	} $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$		77	nC
$Q_{gs}$			21	nC
$Q_{gd}$			25	nC
$R_{thJC}$				0.42 $^\circ\text{C/W}$
$R_{thCS}$		0.21		$^\circ\text{C/W}$

**Source-Drain Diode**

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max
$I_S$	$V_{GS} = 0\text{V}$			94 A
$I_{SM}$	Repetitive, pulse Width Limited by $T_{JM}$			376 A
$V_{SD}$	$I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1			1.4 V
$t_{rr}$	} $I_F = 47\text{A}$ , $-di/dt = 200\text{A}/\mu\text{s}$ $V_R = 100\text{V}$		130	ns
$Q_{RM}$			1.1	$\mu\text{C}$
$I_{RM}$			17	A

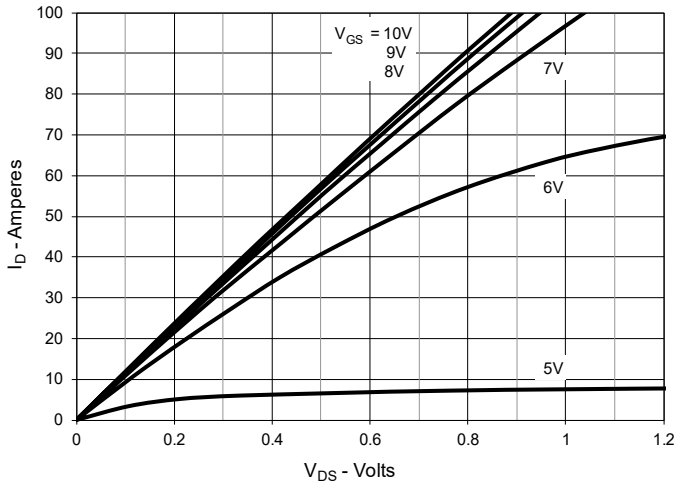
Note: 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

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

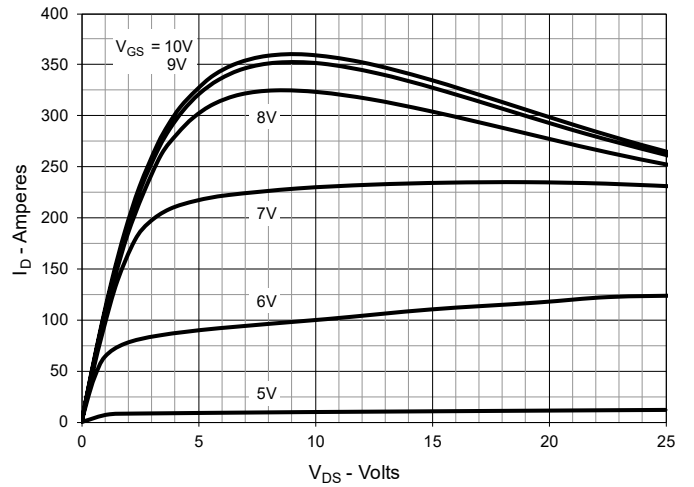
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065B1	6,683,344	6,727,585	7,005,734B2	7,157,338B2
4,860,072	5,017,508	5,063,307	5,381,025	6,259,123B1	6,534,343	6,710,405B2	6,759,692	7,063,975B2	
4,881,106	5,034,796	5,187,117	5,486,715	6,306,728B1	6,583,505	6,710,463	6,771,478B2	7,071,537	

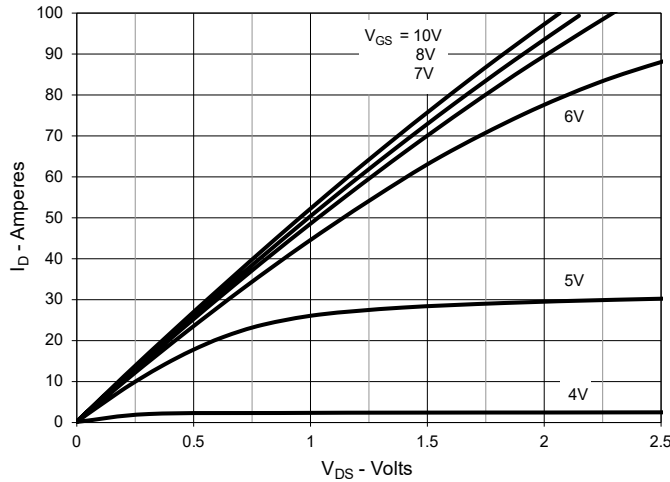
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



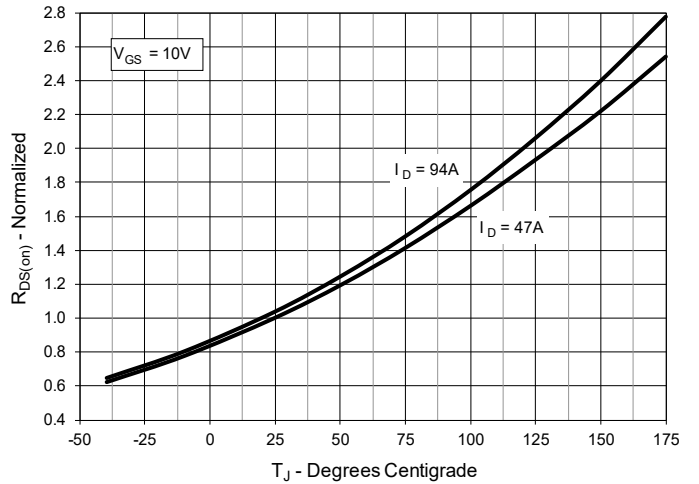
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



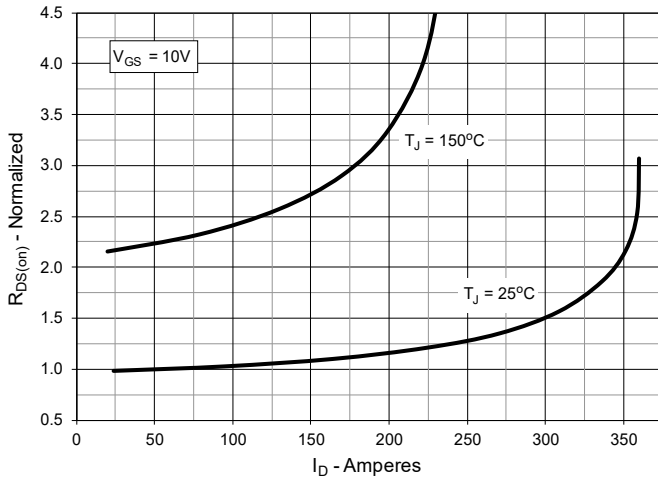
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



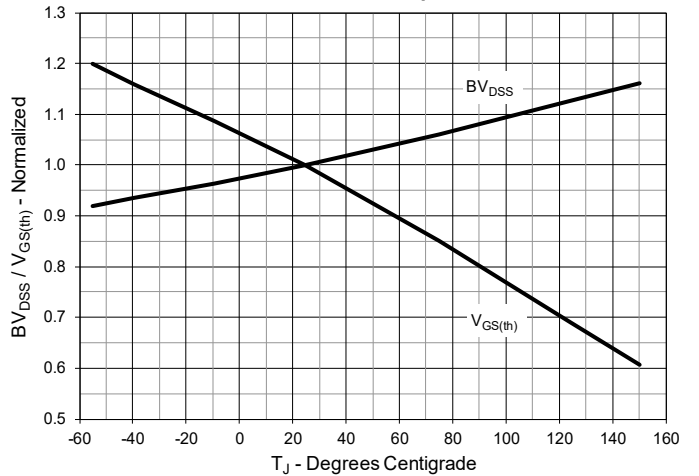
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 47\text{A}$  Value vs. Junction Temperature**



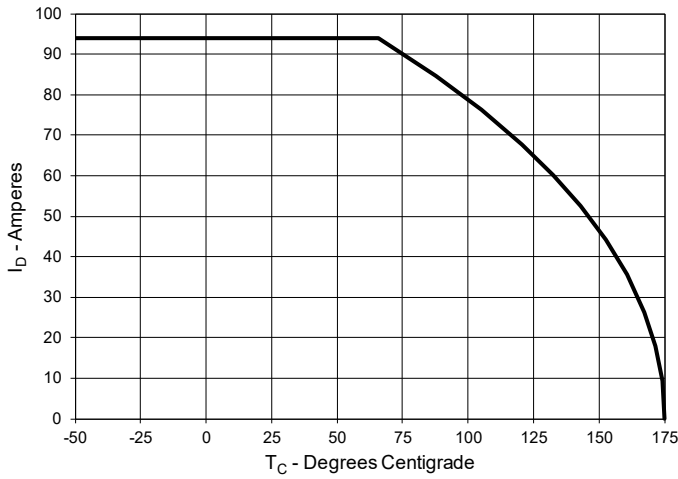
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 47\text{A}$  Value vs. Drain Current**



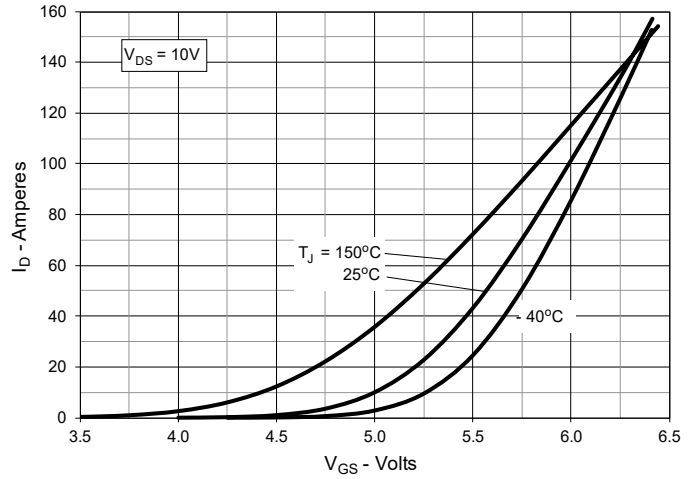
**Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature**



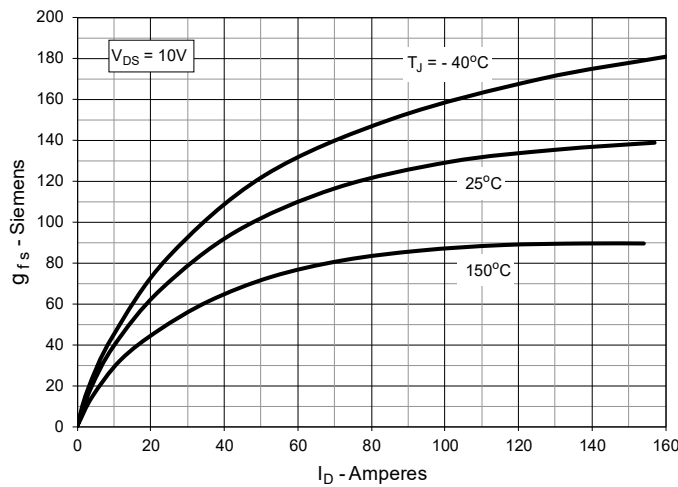
**Fig. 7. Maximum Drain Current vs. Case Temperature**



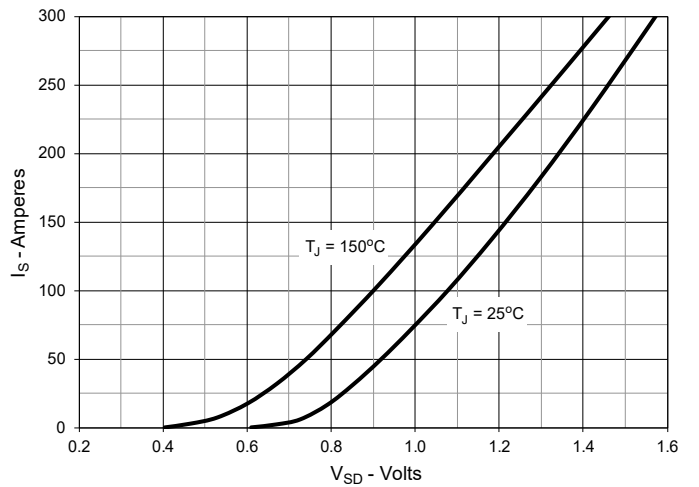
**Fig. 8. Input Admittance**



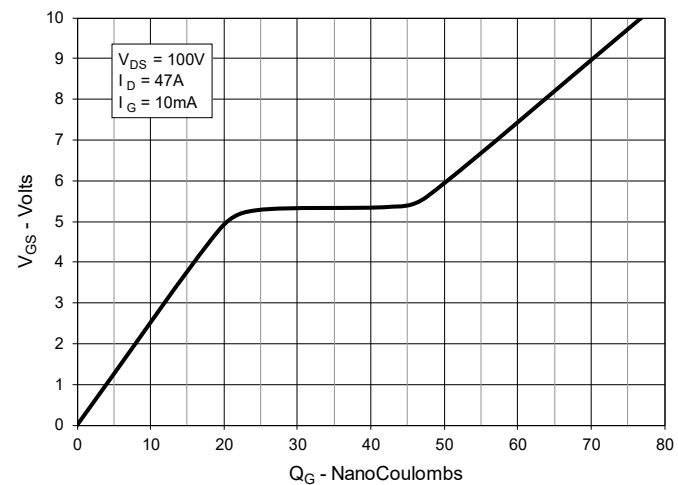
**Fig. 9. Transconductance**



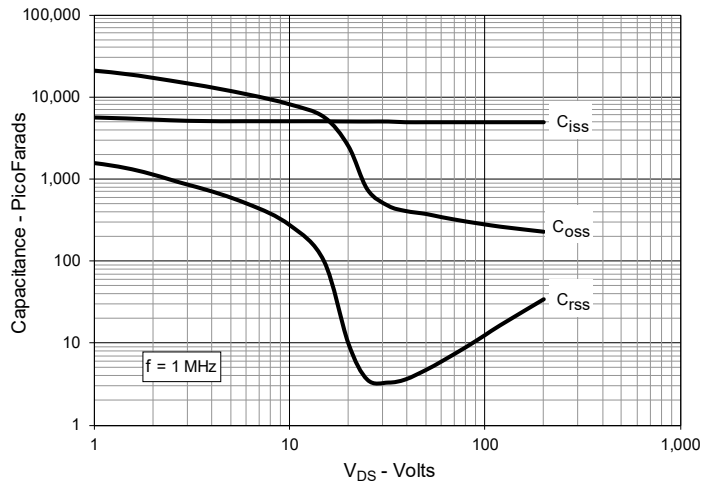
**Fig. 10. Forward Voltage Drop of Intrinsic Diode**



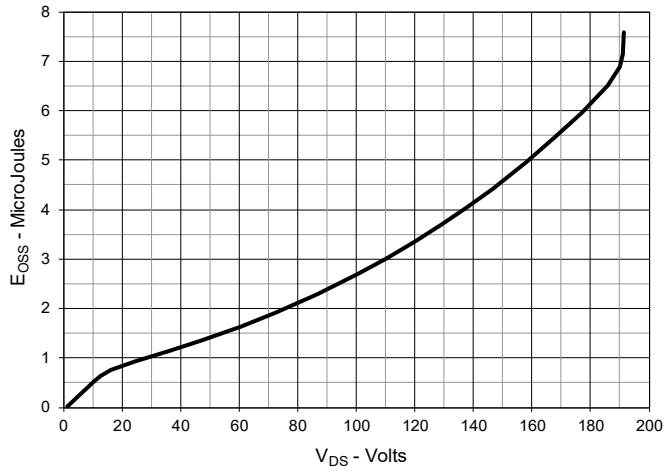
**Fig. 11. Gate Charge**



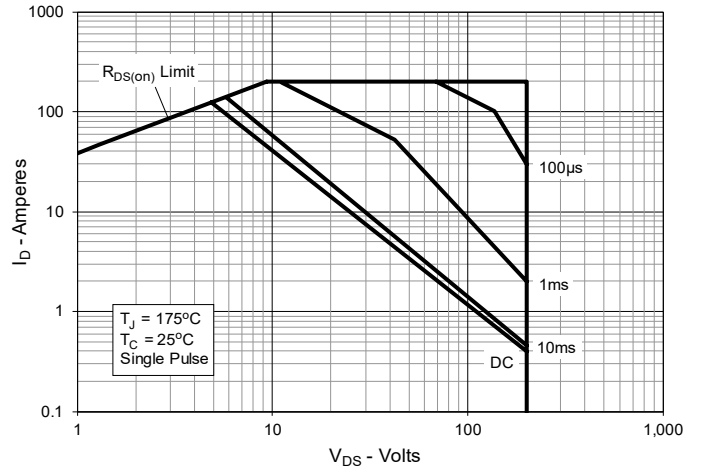
**Fig. 12. Capacitance**



**Fig. 13. Output Capacitance Stored Energy**



**Fig. 14. Forward-Bias Safe Operating Area**



**Fig. 15. Maximum Transient Thermal Impedance**

