

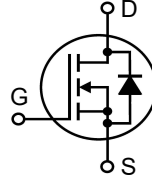
X2-Class HiPerFET™ Power MOSFET

IXFH46N60X2A

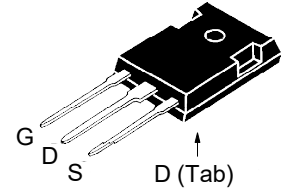
$V_{DSS} = 600V$
 $I_{D25} = 46A$
 $R_{DS(on)} \leq 69m\Omega$

AEC Q101 Qualified

N-Channel Enhancement Mode
 Avalanche Rated



TO-247



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

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	Maximum Ratings	
V_{DSS}	$T_J = 25^\circ C$ to $150^\circ C$	600	V
V_{DGR}	$T_J = 25^\circ C$ to $150^\circ C$, $R_{GS} = 1M\Omega$	600	V
V_{GSS}	Continuous	± 30	V
V_{GSM}	Transient	± 40	V
I_{D25}	$T_C = 25^\circ C$	46	A
I_{DM}	$T_C = 25^\circ C$, Pulse Width Limited by T_{JM}	100	A
I_A	$T_C = 25^\circ C$	10	A
E_{AS}	$T_C = 25^\circ C$	2	J
dv/dt	$I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ C$	50	V/ns
P_D	$T_C = 25^\circ C$	660	W
T_J		-55 ... +150	$^\circ C$
T_{JM}		150	$^\circ C$
T_{stg}		-55 ... +150	$^\circ C$
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
Weight		6	g

Symbol	Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{DSS}	$V_{GS} = 0V$, $I_D = 1mA$	600		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 4mA$	3.5		5.5 V
I_{GSS}	$V_{GS} = \pm 30V$, $V_{DS} = 0V$			± 100 nA
I_{DSS}	$V_{DS} = V_{DSS}$, $V_{GS} = 0V$ $T_J = 125^\circ C$			25 μA 2 mA
$R_{DS(on)}$	$V_{GS} = 10V$, $I_D = 0.5 \cdot I_{D25}$, Note 1			69 m Ω

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	17	28	S
R_{Gi}	Gate Input Resistance		0.9	Ω
C_{iss}	} $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$		4570	pF
C_{oss}			2740	pF
C_{rss}			2.2	pF
Effective Output Capacitance				
$C_{o(er)}$	Energy related } $V_{GS} = 0\text{V}$		165	pF
$C_{o(tr)}$	Time related } $V_{DS} = 0.8 \cdot V_{DSS}$		650	pF
$t_{d(on)}$	} Resistive Switching Times $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 3\Omega$ (External)		25	ns
t_r			24	ns
$t_{d(off)}$			50	ns
t_f			12	ns
$Q_{g(on)}$	} $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$		98	nC
Q_{gs}			31	nC
Q_{gd}			26	nC
R_{thJC}				0.19 $^\circ\text{C/W}$
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	$V_{GS} = 0\text{V}$			46 A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			184 A
V_{SD}	$I_F = I_S, V_{GS} = 0\text{V}$, Note 1			1.4 V
t_{rr}	} $I_F = 23\text{A}, -di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$		180	ns
Q_{RM}			1.5	μC
I_{RM}			16.5	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.

LFMOSFETs 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	

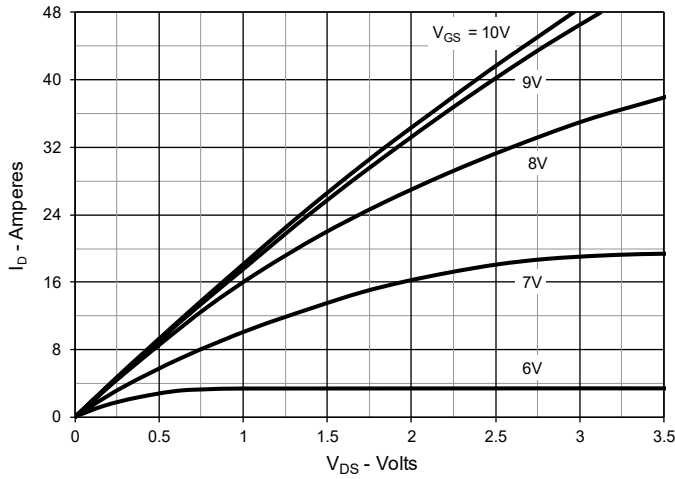
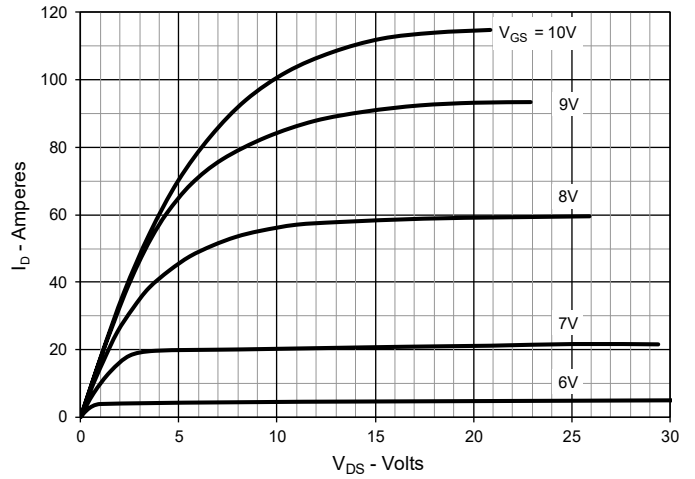
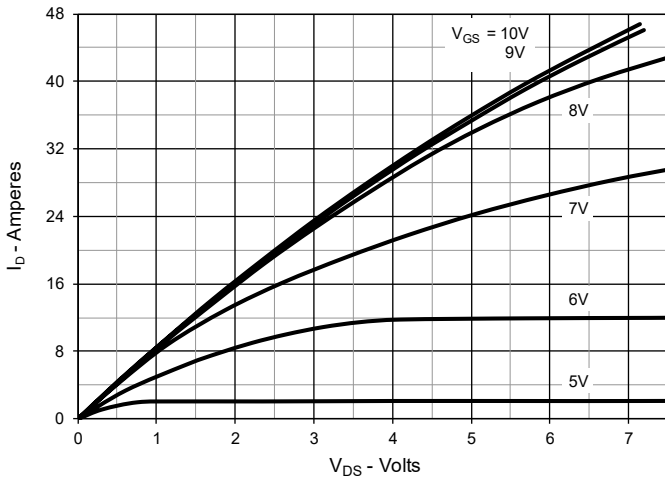
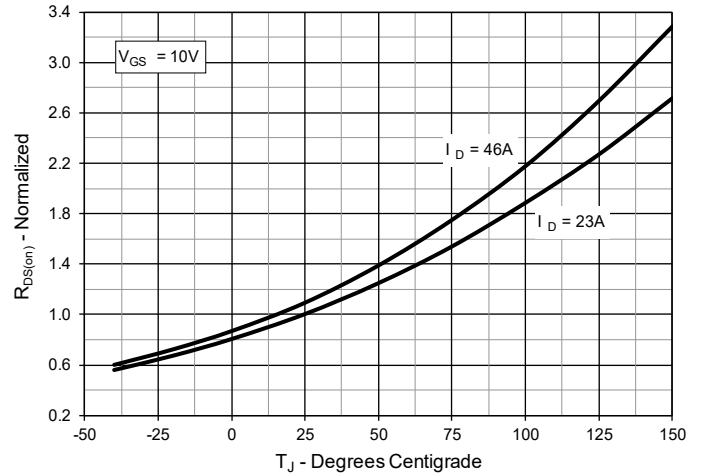
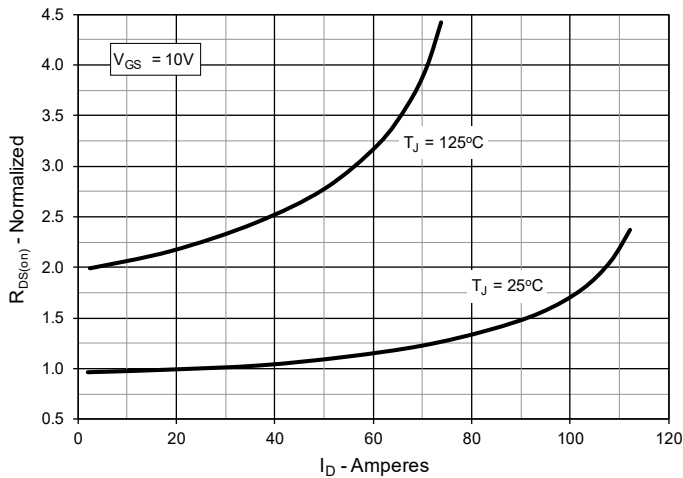
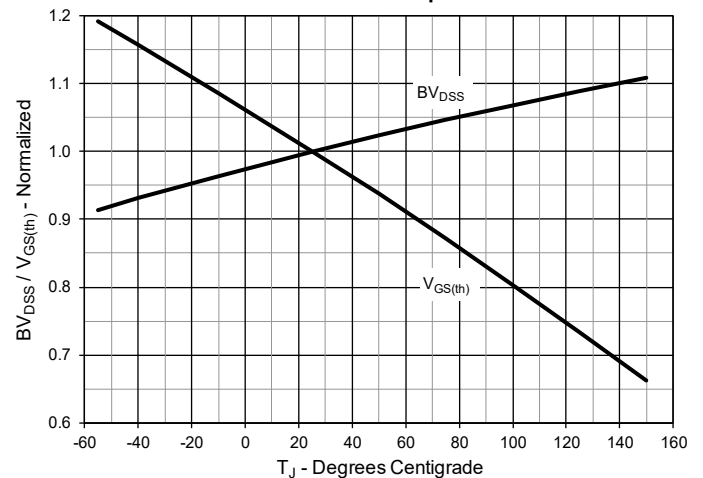
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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

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

Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 23\text{A}$ Value vs. Junction Temperature

Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 23\text{A}$ Value vs. Drain Current

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


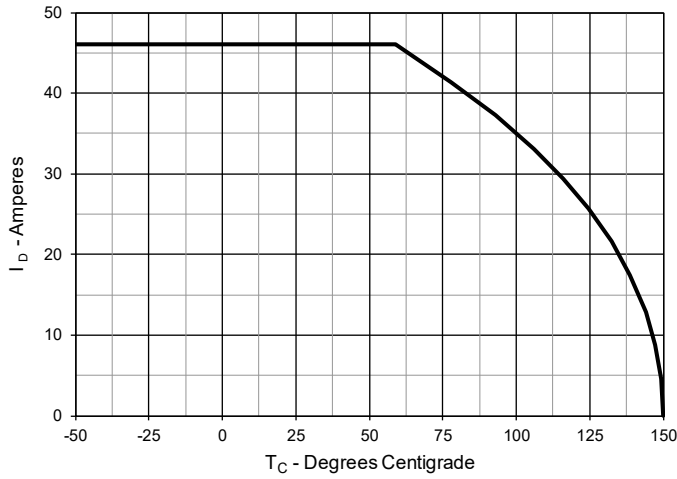
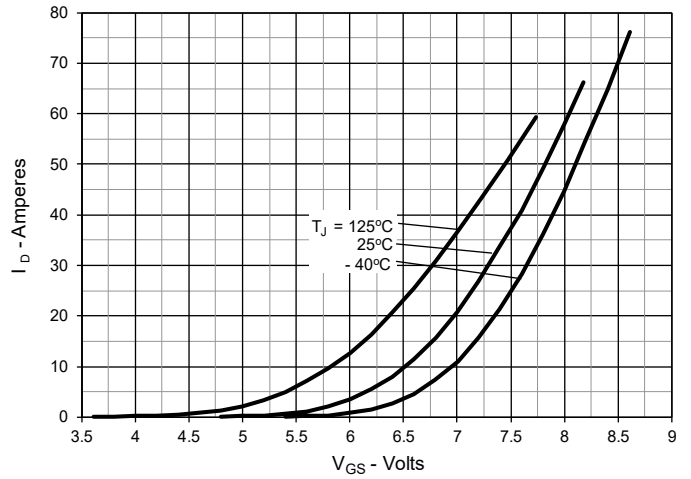
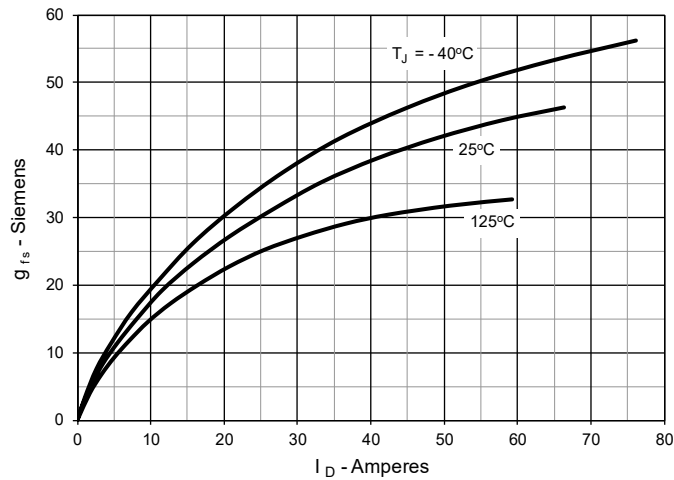
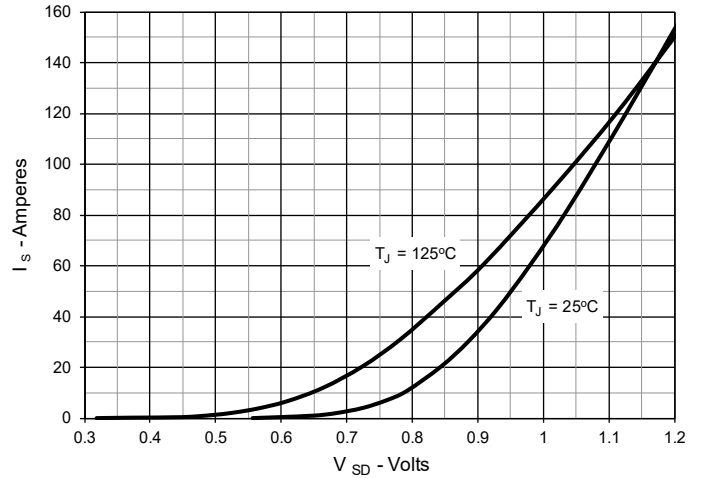
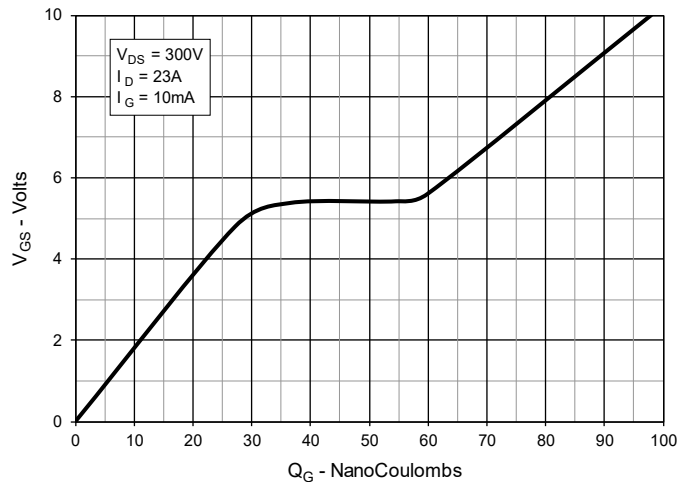
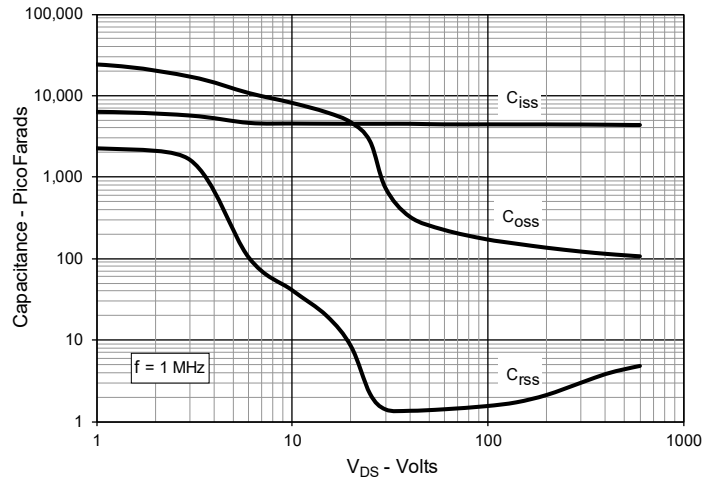
Fig. 7. Maxing Drain Current vs. Case Temperature

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

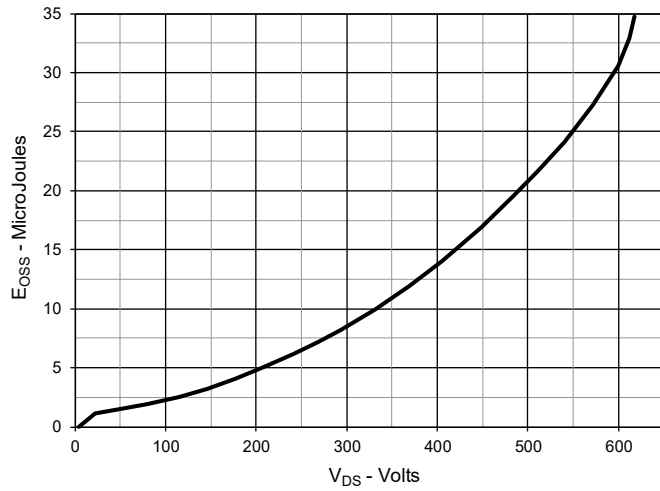


Fig. 14. Forward-Bias Safe Operating Area

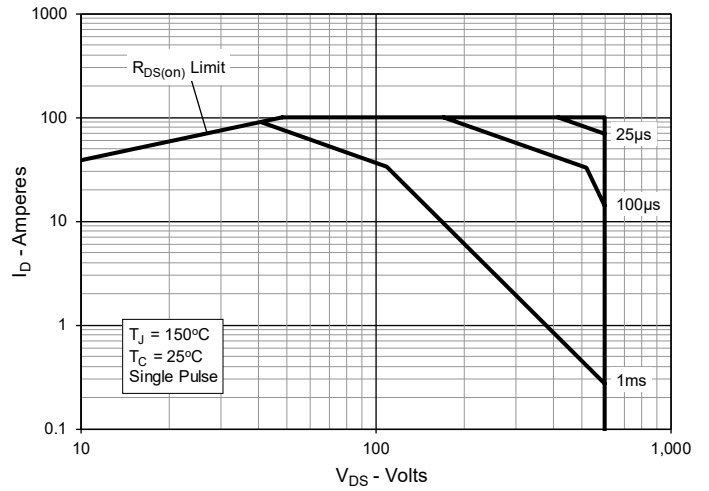


Fig. 15. Maximum Transient Thermal Impedance

