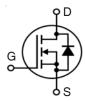


# X3-Class HiPerFET™ **Power MOSFET**

IXFA56N30X3 IXFP56N30X3 IXFH56N30X3

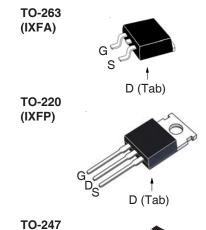
300V 56A I<sub>D25</sub>  $27m\Omega$  $\mathbf{R}_{\mathrm{DS(on)}}$ 

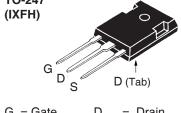
N-Channel Enhancement Mode Avalanche Rated



Symbol	Test Conditions	Maximum Ratings		
V <sub>DSS</sub>	$T_J = 25^{\circ}C \text{ to } 150^{\circ}C$	300	V	
V <sub>DGR</sub>	$T_{_J} = 25^{\circ}C$ to 150°C, $R_{_{GS}} = 1M\Omega$	300	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	56	A	
I <sub>DM</sub>	$T_{\rm C} = 25^{\circ}$ C, Pulse Width Limited by $T_{\rm JM}$	112	Α	
I <sub>A</sub>	T <sub>c</sub> = 25°C	28	A	
<b>E</b> <sub>as</sub>	$T_{c} = 25^{\circ}C$	700	mJ	
dv/dt	$I_{S} \leq I_{DM}, V_{DD} \leq V_{DSS}, T_{J} \leq 150^{\circ}C$	50	V/ns	
$P_{D}$	T <sub>C</sub> = 25°C	320	W	
T <sub>J</sub>		-55 +150	°C	
$T_{JM}$		150	°C	
T <sub>stg</sub>		-55 +150	°C	
T <sub>L</sub>	Maximum Lead Temperature for Solderi	ng 300	°C	
T <sub>SOLD</sub>	1.6 mm (0.062in.) from Case for 10s	260	°C	
F <sub>c</sub>	Mounting Force (TO-263) Mounting Torque (TO-220 & TO-247)	1065 / 2.214.6 1.13 / 10	N/lb Nm/lb.in	
Weight	TO-263	2.5	g	
	TO-220 TO-247	3.0 6.0	g g	

Symbol (T <sub>J</sub> = 25°C,	Test Conditions Unless Otherwise Specified)	Charac Min.	cteristic	Values   Ma	
BV <sub>DSS</sub>	$V_{GS} = 0V, I_D = 1mA$	300			V
V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_{D} = 1.5 \text{mA}$	2.5		4.5	V
GSS	$V_{GS} = \pm 20V, V_{DS} = 0V$			±100	nA
l <sub>DSS</sub>	$V_{DS} = V_{DSS}$ , $V_{GS} = 0V$ $T_{J} = 125^{\circ}C$			5 500	μ <b>Α</b> μ <b>Α</b>
R <sub>DS(on)</sub>	$V_{GS} = 10V, I_{D} = 0.5 \bullet I_{D25}, Note 1$		21	27	$m\Omega$





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

#### **Features**

- International Standard Packages

- 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



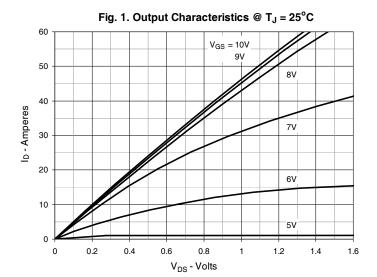
		racteristic Values		
$(T_{_{J}} = 25^{\circ}C, Unless Otherwise Specified)$ Min.			Тур.	Max
g <sub>fs</sub>	$V_{DS} = 10V, I_{D} = 0.5 \bullet I_{D25}, Note 1$	26	43	S
$R_{Gi}$	Gate Input Resistance		2.3	Ω
C <sub>iss</sub>			3750	pF
C <sub>oss</sub>	$V_{GS} = 0V, V_{DS} = 25V, f = 1MHz$		560	pF
C <sub>rss</sub>			3	pF
	Effective Output Capacitance			
$C_{o(er)}$	Energy related \ V <sub>GS</sub> = 0V		210	pF
C <sub>o(tr)</sub>	Time related $\int V_{DS}^{GS} = 0.8 \cdot V_{DSS}$		860	pF
t <sub>d(on)</sub>	Resistive Switching Times		21	ns
t <sub>r</sub>	$V_{GS} = 10V, V_{DS} = 0.5 \cdot V_{DSS}, I_{D} = 0.5 \cdot I_{D25}$		26	ns
t <sub>d(off)</sub>	$R_{\rm G} = 5\Omega$ (External)		64	ns
t,	n <sub>g</sub> = 352 (External)		10	ns
$Q_{g(on)}$			56	nC
Q <sub>gs</sub>	$V_{GS} = 10V$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$		18	nC
Q <sub>gd</sub>			17	nC
R <sub>thJC</sub>				0.39 °C/W
R <sub>thCS</sub>	TO-220		0.50	°C/W
	TO-247		0.21	°C/W

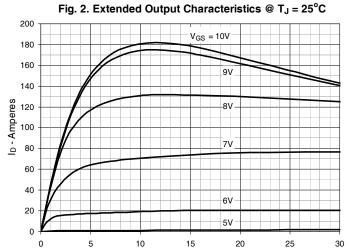
### Source-Drain Diode

SymbolTest ConditionsCharacteristics(T <sub>J</sub> = 25°C, Unless Otherwise Specified)Min.			cteristic Typ.	Values Max	
I <sub>s</sub>	$V_{GS} = 0V$			56	Α
I <sub>SM</sub>	Repetitive, Pulse Width Limited by $T_{_{\rm JM}}$			224	Α
V <sub>SD</sub>	$I_F = I_S$ , $V_{GS} = 0V$ , Note 1			1.4	٧
$\left\{ egin{array}{c} \mathbf{t}_{rr} \\ \mathbf{Q}_{RM} \\ \mathbf{I}_{RM} \end{array} \right\}$	$I_F = 28A$ , $-di/dt = 100A/\mu s$ $V_R = 100V$		115 580 10		ns nC A

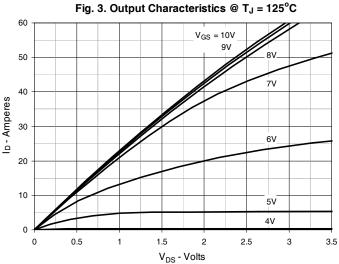
Note 1. Pulse test,  $t \le 300 \mu s$ , duty cycle,  $d \le 2\%$ .

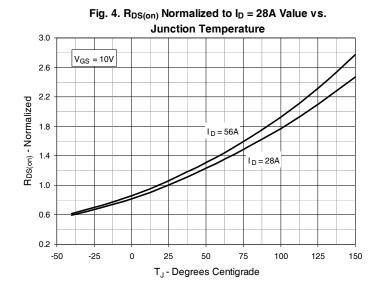


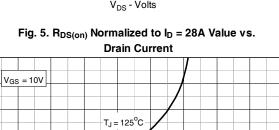




V<sub>DS</sub> - Volts







100

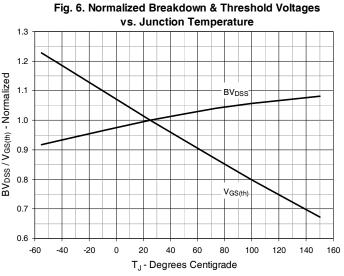
I<sub>D</sub> - Amperes

120

140

160

180



60

40

4.5

4.0

3.5

3.0

2.5

2.0

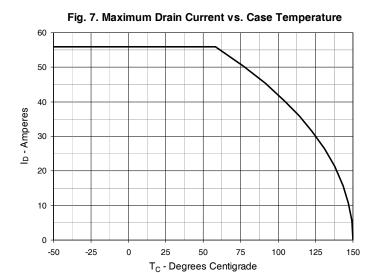
1.5

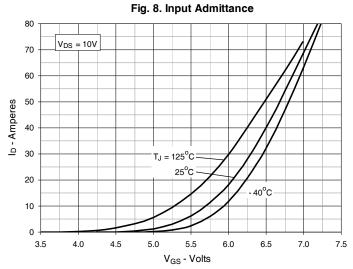
1.0

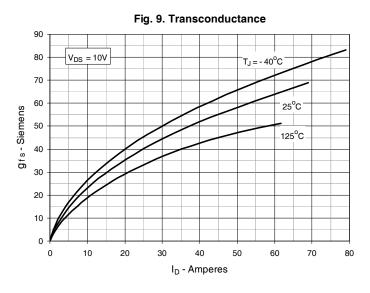
0

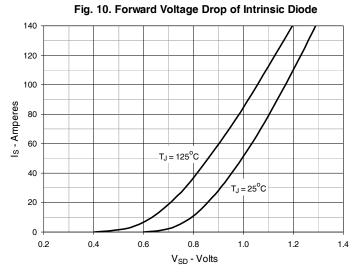
20

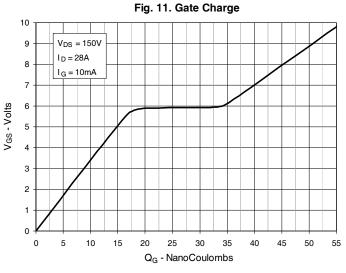
RDS(on) - Normalized

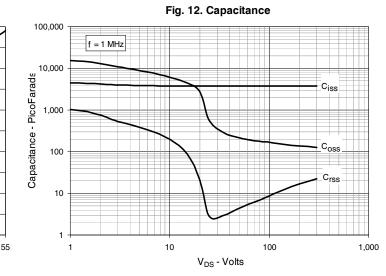






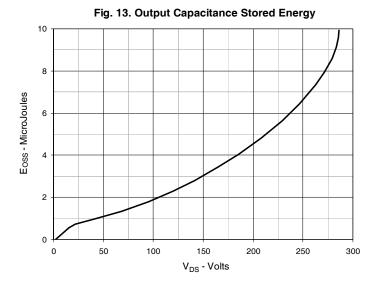






IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.





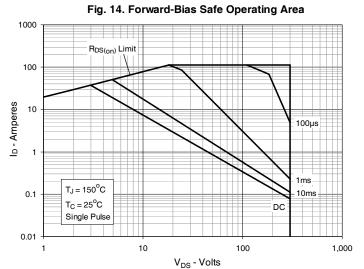
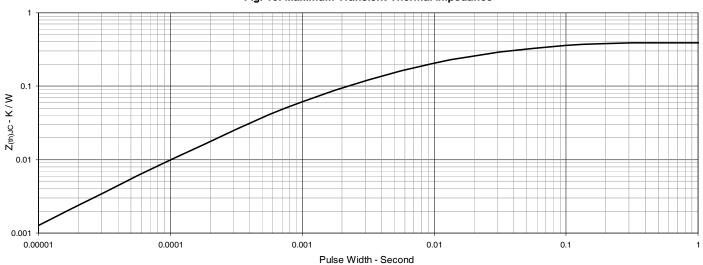
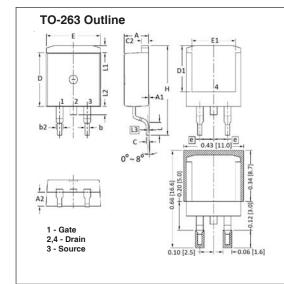


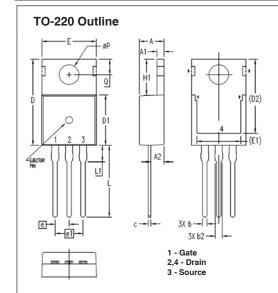
Fig. 15. Maximum Transient Thermal Impedance



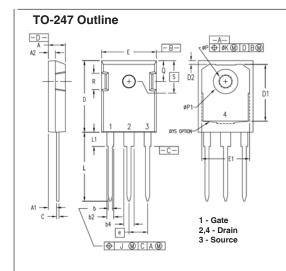




SYM	INCHES		MILLIMETER	
SIM	MIN	MAX	MIN	MAX
Α	.170	.185	4.30	4.70
A1	.000	.008	0.00	0.20
A2	.091	.098	2.30	2.50
b	.028	.035	0.70	0.90
b2	.046	.060	1.18	1.52
С	.018	.024	0.45	0.60
C2	.049	.060	1.25	1.52
D	.340	.370	8.63	9.40
D1	.300	.327	7.62	8.30
E	.380	.410	9.65	10.41
E1	.270	.330	6.86	8.38
е	.100	BSC	2.54 BSC	
Н	.580	.620	14.73	15.75
L	.075	.105	1.91	2.67
L1	.039	.060	1.00	1.52
L2	_	.070	_	1.77
L3	.010 BSC 0.254 BSC		BSC	



MYZ	INC	INCHES		ETERS
2114	MIN	MAX	MIN	MAX
Α	.169	.185	4.30	4.70
A1	.047	.055	1.20	1.40
A2	.079	.106	2.00	2.70
Ь	.024	.039	0.60	1.00
b2	.045	.057	1.15	1.45
С	.014	.026	0.35	0.65
D	.587	.626	14.90	15.90
D1	.335	.370	8.50	9.40
(D2)	.500	.531	12.70	13.50
Ε	.382	.406	9.70	10.30
(E1)	.283	.323	7.20	8.20
е	.100 BSC		2.54	BSC
e1	.200 BSC		5.08 BSC	
H1	.244	.268	6.20	6.80
L	.492	.547	12.50	13.90
L1	.110	.154	2.80	3.90
ØΡ	.134	.150	3.40	3.80
Q	.106	.126	2.70	3.20



SYM	INCHES		MILLIMETERS		
STIM	MIN	MAX	MIN	MAX	
Α	.190	.205	4.83	5.21	
A1	.090	.100	2.29	2.54	
A2	.075	.085	1.91	2.16	
Ь	.045	.055	1.14	1.40	
b2	.075	.087	1.91	2.20	
b4	.115	.126	2.92	3.20	
С	.024	.031	0.61	0.80	
D	.819	.840	20.80	21.34	
D1	.650	.690	16.51	17.53	
D2	.035	.050	0.89	1.27	
Ε	.620	.635	15.75	16.13	
E1	.545	.565	13.84	14.35	
е	.215	.215 BSC		BSC	
J		.010		0.25	
K		.025		0.64	
L	.780	.810	19.81	20.57	
L1	.150	.170	3.81	4.32	
ØΡ	.140	.144	3.55	3.65	
øP1	.275	.290	6.99	7.37	
Q	.220	.244	5.59	6.20	
R	.170	.190	4.32	4.83	
S	.242 BSC		6.15	BSC	





Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.