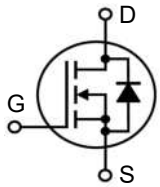
IXYS

X2-Class Power MOSFET

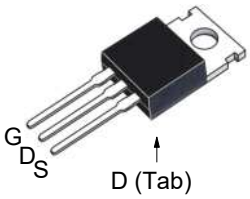
IXTP14N60X2

V_{DSS} = 600V
I_{D25} = 14A
$R_{DS(on)}$ ≤ 250mΩ

N-Channel Enhancement Mode



TO-220 (IXTP)



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

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	600	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	600	V
V_{GSS}	Continuous	±30	V
V_{GSM}	Transient	±40	V
I_{D25}	T_C = 25°C	14	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	18	A
I_A	T_C = 25°C	7	A
E_{AS}	T_C = 25°C	150	mJ
dv/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le$ 150°C	15	V/ns
P_D	T_C = 25°C	180	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering 1.6 mm (0.062 in.) from Case for 10s	300	°C
M_d	Mounting Torque	1.13 / 10	Nm/lb.in
Weight		3	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 250μA	600			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.5		4.5	V
I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V			±100	nA
I_{DSS}	V_{DS} = V_{DSS}, V_{GS} = 0V			10	μA
	T_J = 125°C			150	μA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 0.5 • I_{D25}, Note 1			250	mΩ

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

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Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max	
g_{fs}	V_{DS} = 10V, I_D = 0.5 • I_{D25}, Note 1	7	12		S
R_{Gi}	Gate Input Resistance		5		Ω
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		740		pF
C_{oss}			1310		pF
C_{rss}			20		pF
	Effective Output Capacitance				
$C_{o(er)}$	Energy related; V_{GS} = 0V, V_{DS} = 0.8 • V_{DSS}		55		pF
$C_{o(tr)}$	Time related; V_{GS} = 0V, V_{DS} = 0.8 • V_{DSS}		160		pF
$t_{d(on)}$	**Resistive Switching Times** V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}, R_G = 30Ω (External)		23		ns
t_r			27		ns
$t_{d(off)}$			75		ns
t_f			17		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		16.7		nC
Q_{gs}			4.7		nC
Q_{gd}			7.7		nC
R_{thJC}				0.69	°C/W
R_{thCS}	TO-220		0.50		°C/W

Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max	
I_S	V_{GS} = 0V			14	A
I_{SM}	Repetitive, pulse Width Limited by T_{JM}			56	A
V_{SD}	I_F = I_S, V_{GS} = 0V, Note 1			1.4	V
t_{rr}	I_F = 7A, -di/dt = 100A/μs, V_R = 100V		320		ns
Q_{RM}			4.3		μC
I_{RM}			27.0		A

Note 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 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°C

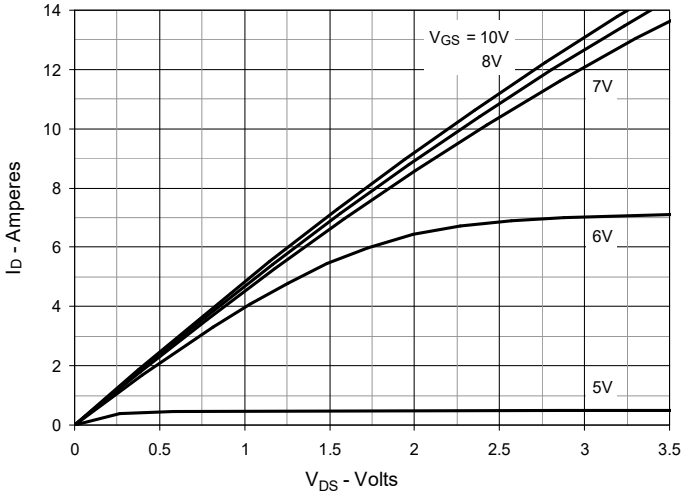

Fig. 2. Extended Output Characteristics @ T_J = 25°C

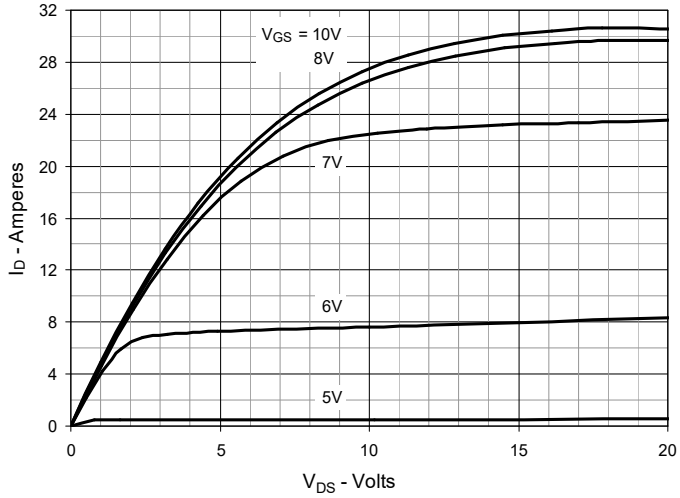

Fig. 3. Output Characteristics @ T_J = 125°C

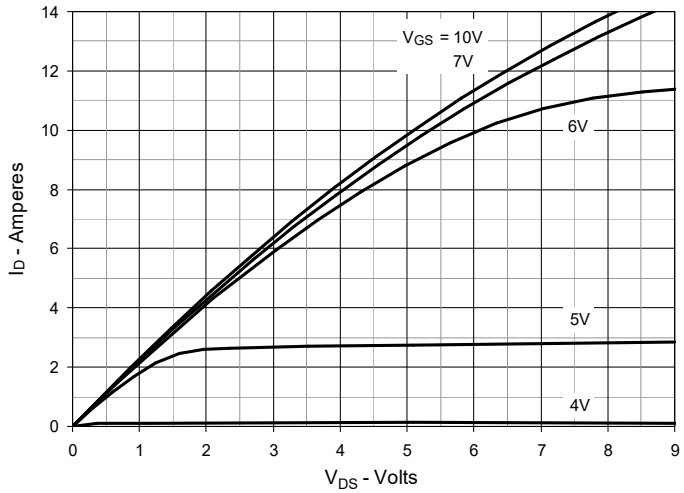

Fig. 4. $R_{DS(on)}$ Normalized to I_D = 7A Value vs. Junction Temperature

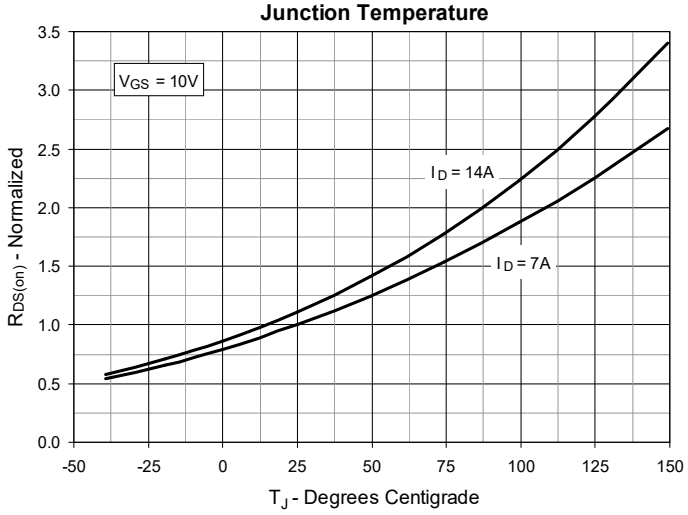

Fig. 5. $R_{DS(on)}$ Normalized to I_D = 7A Value vs. Drain Current

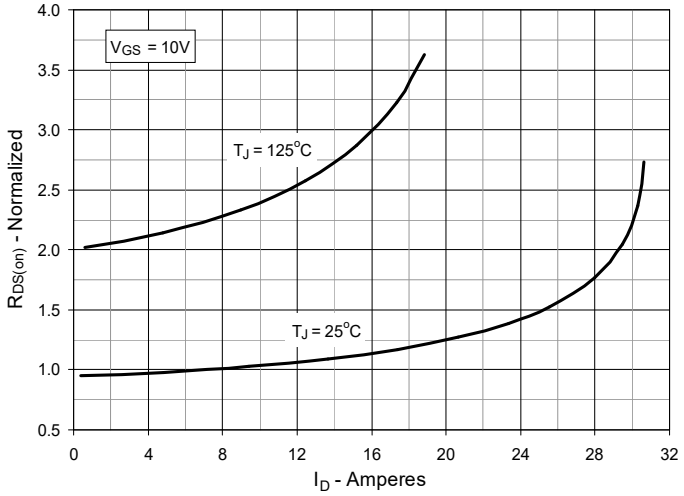

Fig. 6. Maximum Drain Current vs. Case Temperature

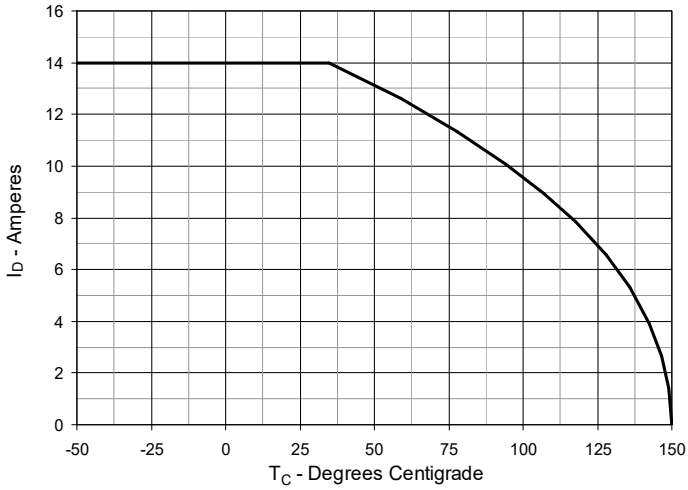

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Fig. 7. Input Admittance

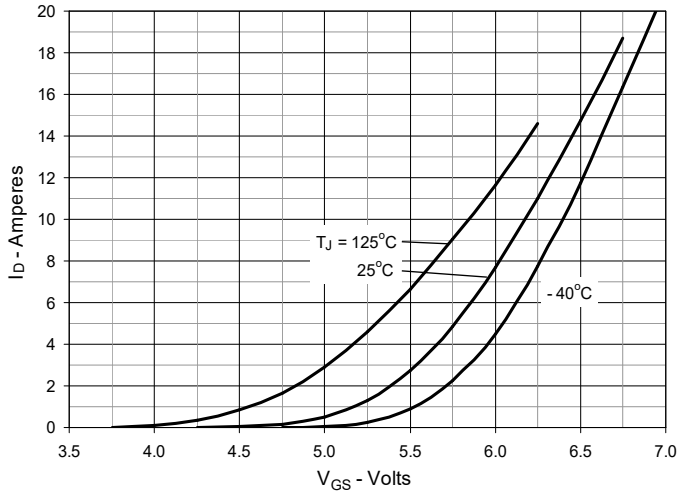


Fig. 8. Transconductance

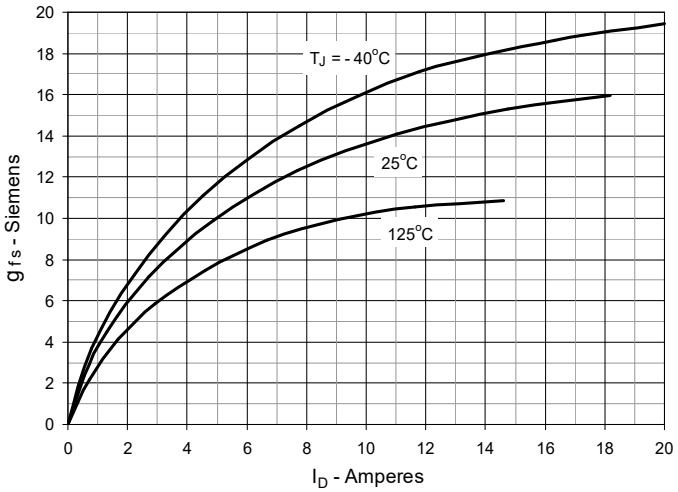


Fig. 9. Forward Voltage Drop of Intrinsic Diode

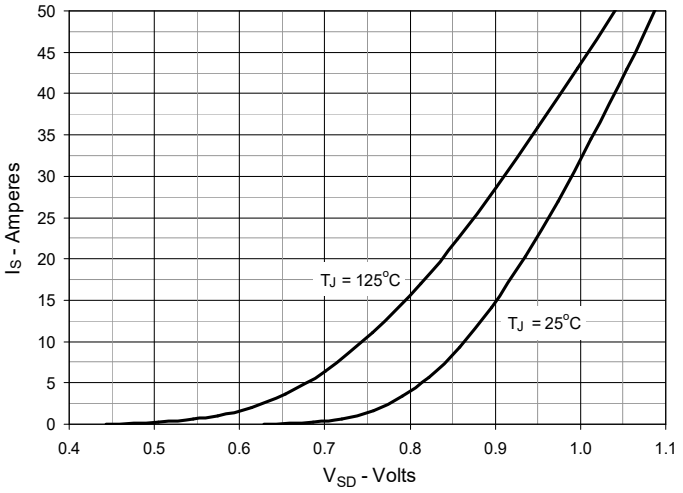


Fig. 10. Gate Charge

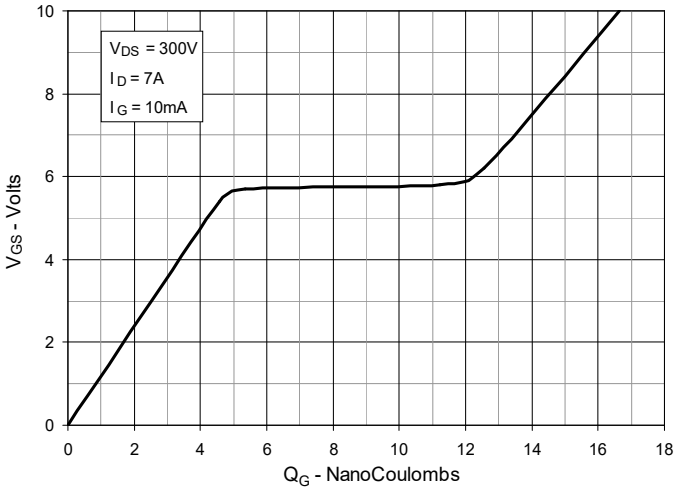


Fig. 11. Capacitance

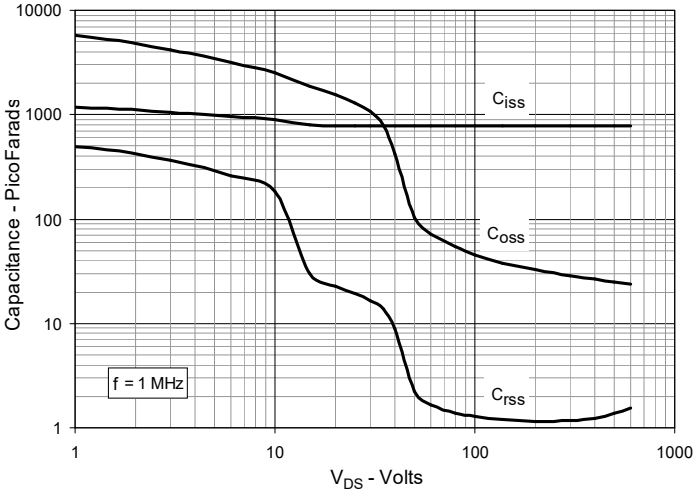
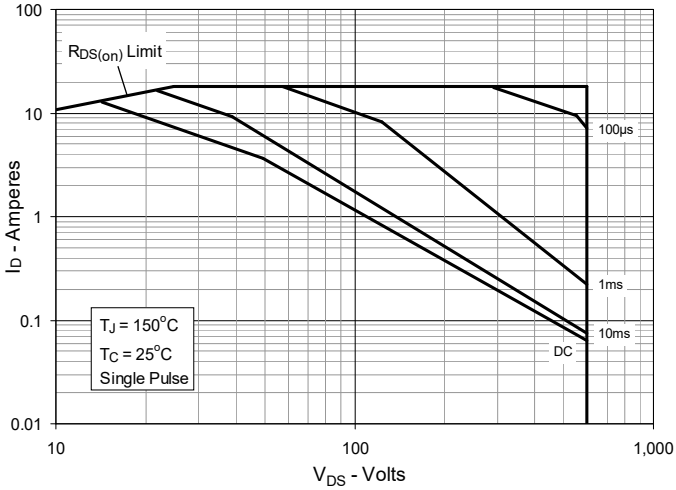
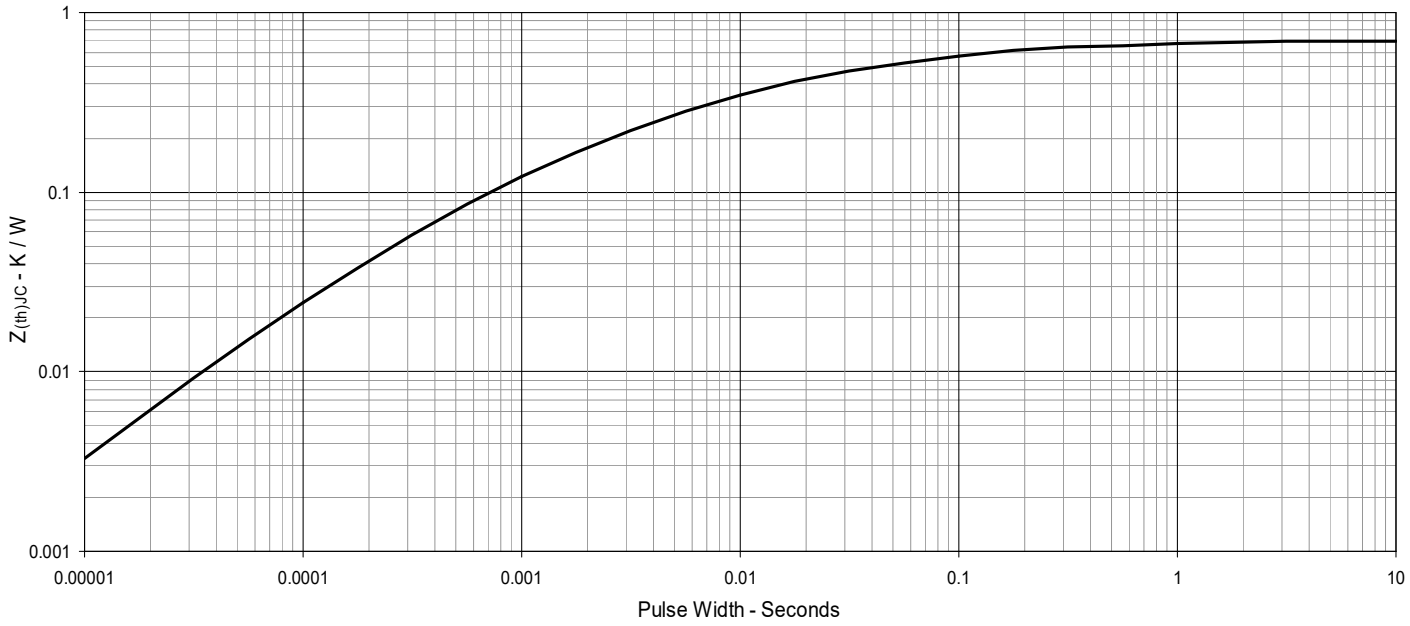


Fig. 12. Forward-Bias Safe Operating Area



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

Fig. 13. Maximum Transient Thermal Impedance



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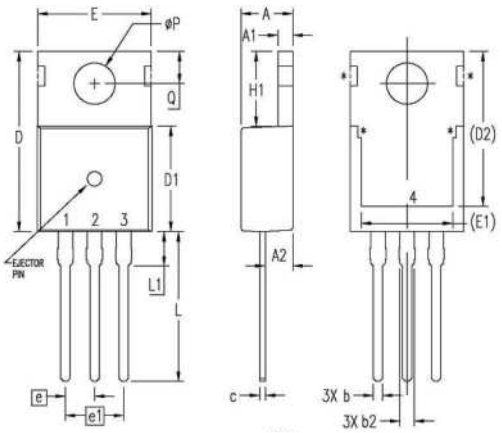
TO-220 Outline



1 - Gate
2,4 - Drain
3 - Source

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.169	.185	4.30	4.70
A1	.047	.055	1.20	1.40
A2	.079	.106	2.00	2.70
b	.024	.039	0.60	1.00
b2	.045	.057	1.15	1.45
c	.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
E	.382	.406	9.70	10.30
(E1)	.283	.323	7.20	8.20
e	.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
ØP	.134	.150	3.40	3.80
Q	.106	.126	2.70	3.20

NOTE:
1. These dimensions do not inclue mold protusion.
2. Metal finish – Matte pure tin plating except trim area.
3. Pin call out: 1 – GATE 3 – SOURCE (EMITTER for IGBT)
   2 – DRAIN (COLLECTOR for IGBT) 4 – DRAIN (Connected with #2 internally)
4. Ejector pin location & diameter will vary depending on packaging suppliers.
5. * marked area will vary depending on packaging suppliers.

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