IXYS

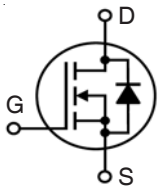
X3-Class HiPerFET™ Power MOSFET

IXFP56N30X3M

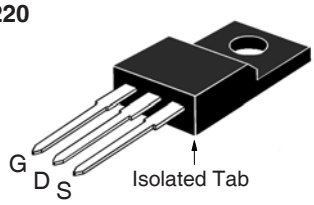
V_{DSS} = 300V
I_{D25} = 56A
$R_{DS(on)}$ ≤ 27mΩ

(Electrically Isolated Tab)

N-Channel Enhancement Mode



OVERMOLDED TO-220



G = Gate D = Drain
S = Source

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	300	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	300	V
V_{GSS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_C = 25°C, Limited by T_{JM}	56	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	112	A
I_A	T_C = 25°C	28	A
E_{AS}	T_C = 25°C	700	mJ
dv/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$	50	V/ns
P_D	T_C = 25°C	36	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
V_{ISOL}	50/60 Hz, 1 Minute	2500	V~
M_d	Mounting Torque	1.13 / 10	Nm/lb.in
Weight		2.5	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 1mA	300			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 1.5mA	2.5		4.5	V
I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
I_{DSS}	$V_{DS} = V_{DSS}$, V_{GS} = 0V			5	μA
	T_J = 125°C			500	μA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 28A, Note 1		21	27	mΩ

Features

- International Standard Package
- Plastic Overmolded Tab
- Low $R_{DS(ON)}$ and Q_G
- Avalanche Rated
- 2500V~ Electrical Isolation
- Low Package Inductance

Advantages

- High Power Density
- Easy to Mount
- Space Savings

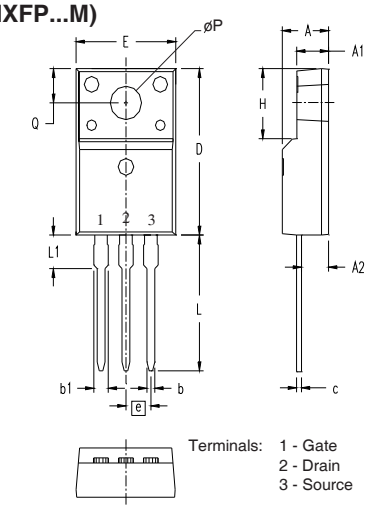
Applications

- 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 = 28A, Note 1	26	43		S
R_{Gi}	Gate Input Resistance		2.3		Ω
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		3750		pF
C_{oss}			560		pF
C_{rss}			3		pF
	Effective Output Capacitance				
$C_{o(er)}$	Energy related; V_{GS} = 0V, V_{DS} = 0.8 • V_{DSS}		210		pF
$C_{o(tr)}$	Time related; V_{GS} = 0V, V_{DS} = 0.8 • V_{DSS}		860		pF
$t_{d(on)}$	**Resistive Switching Times**		21		ns
t_r	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 28A		26		ns
$t_{d(off)}$	R_G =5Ω (External)		64		ns
t_f			10		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 28A		56		nC
Q_{gs}			18		nC
Q_{gd}			17		nC
R_{thJC}				3.5	°C/W
R_{thCS}			0.50		°C/W

OVERMOLDED TO-220 (IXFP...M)



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.177	.193	4.50	4.90
A1	.092	.108	2.34	2.74
A2	.101	.117	2.56	2.96
b	.028	.035	0.70	0.90
b1	.050	.058	1.27	1.47
c	.018	.024	0.45	0.60
D	.617	.633	15.67	16.07
E	.392	.408	9.96	10.36
e	.100 BSC		2.54 BSC	
H	.255	.271	6.48	6.88
L	.499	.523	12.68	13.28
L1	.119	.135	3.03	3.43
øP	.121	.129	3.08	3.28
Q	.126	.134	3.20	3.40

Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max	
I_S	V_{GS} = 0V			56	A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			224	A
V_{SD}	I_F = I_S, V_{GS} = 0V, Note 1			1.4	V
t_{rr}	I_F = 28A, -di/dt = 100A/μs		115		ns
Q_{RM}	V_R = 100V		580		nC
I_{RM}			10		A

Note 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

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IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123B1 6,306,728B1 6,404,065B1 6,534,343 6,583,505 6,683,344 6,710,405B2 6,710,463 6,727,585 6,759,692 6,771,478B2 7,005,734B2 7,063,975B2 7,071,537 7,157,338B2

Fig. 1. Output Characteristics @ T_J = 25°C

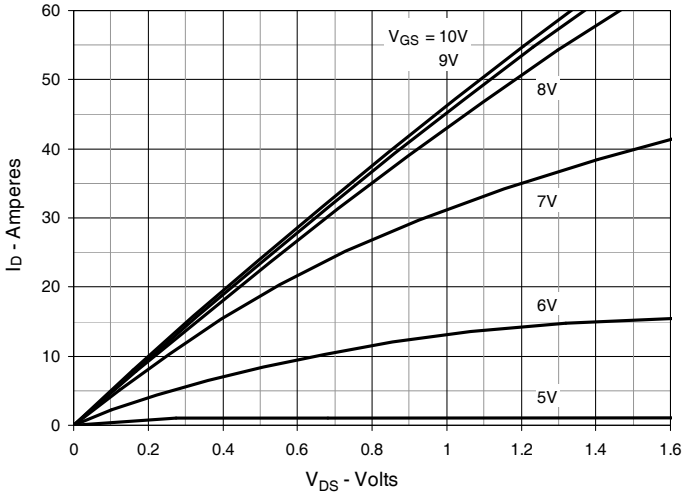


Fig. 2. Extended Output Characteristics @ T_J = 25°C

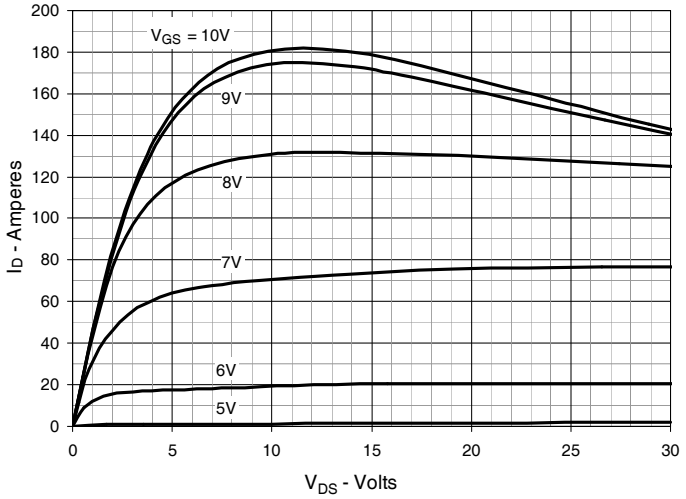


Fig. 3. Output Characteristics @ T_J = 125°C

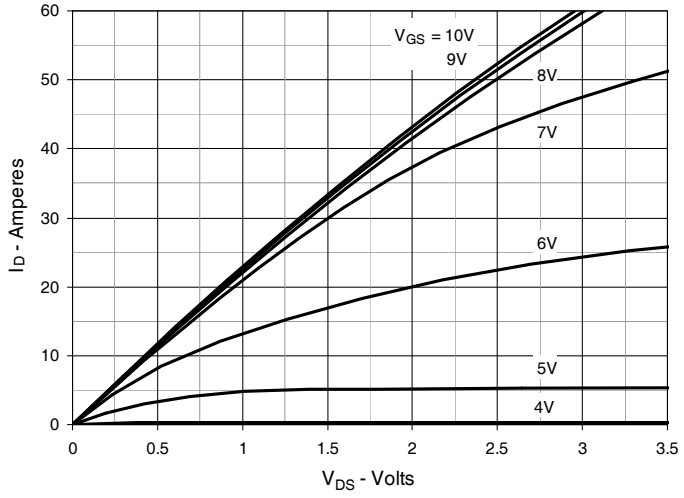


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 28A Value vs. Junction Temperature

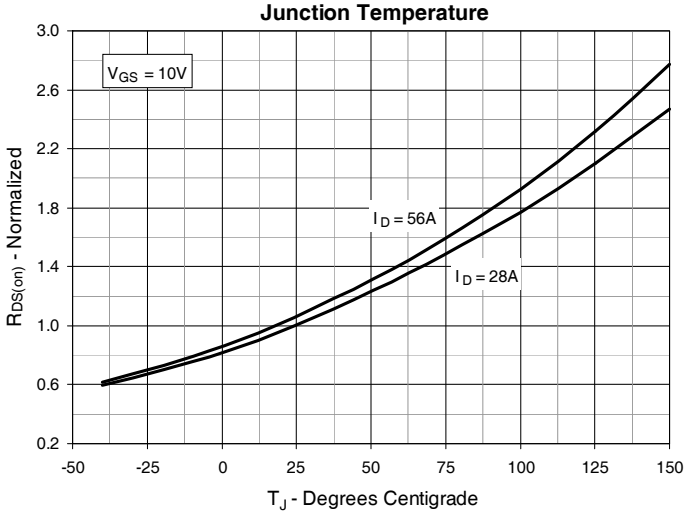


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 28A Value vs. Drain Current

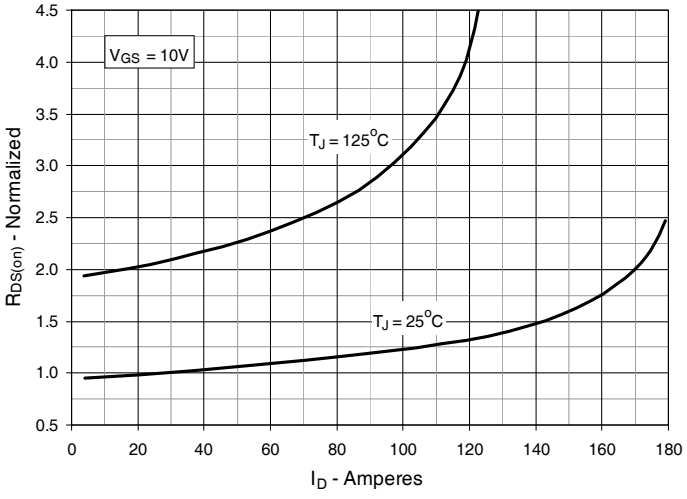
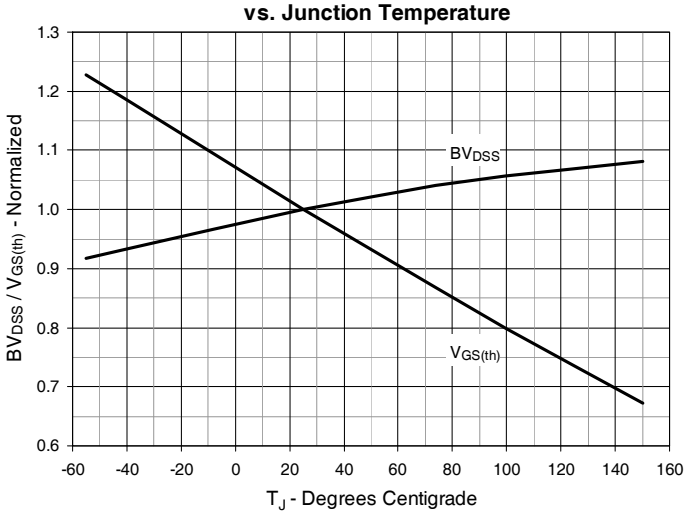


Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature



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Fig. 7. Input Admittance

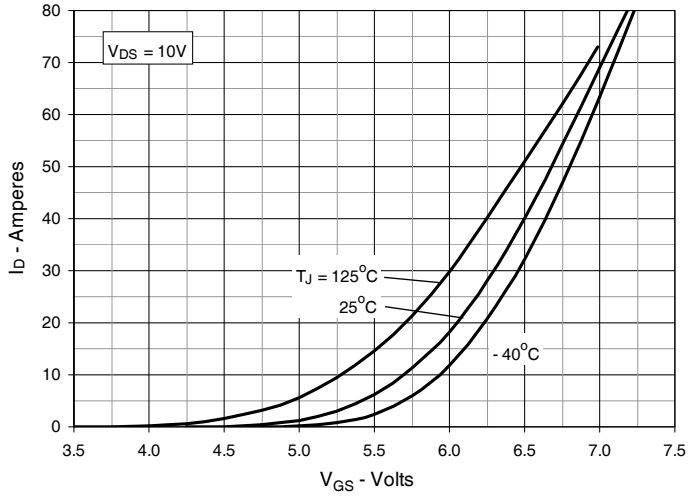


Fig. 8. Transconductance

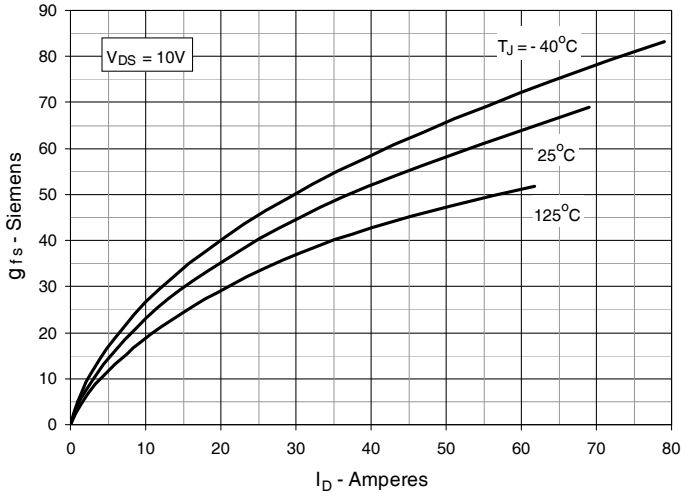


Fig. 9. Forward Voltage Drop of Intrinsic Diode

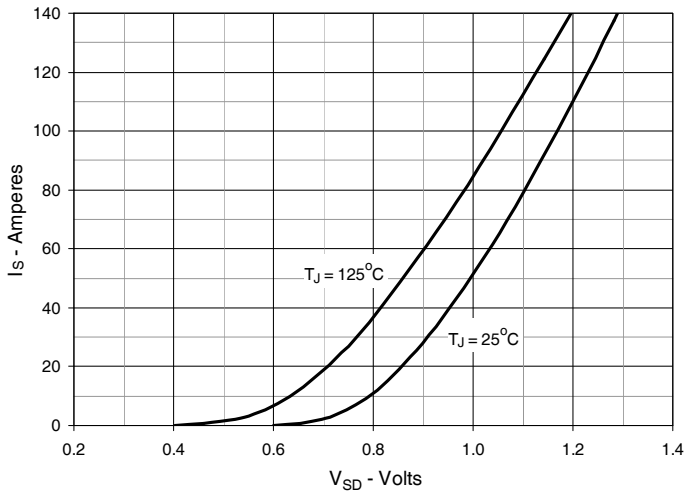


Fig. 10. Gate Charge

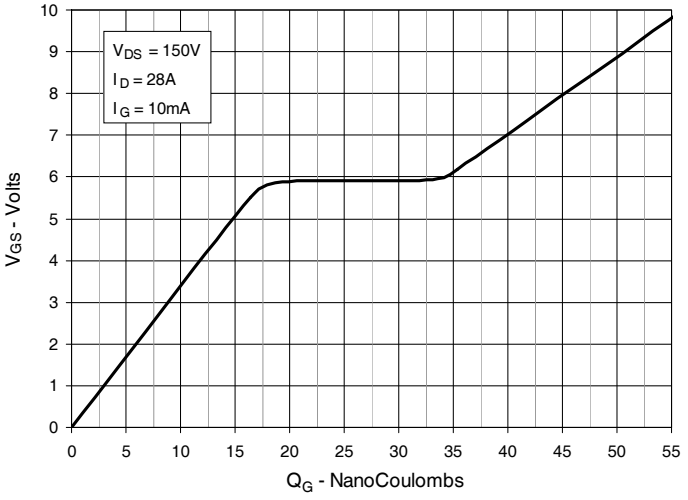


Fig. 11. Capacitance

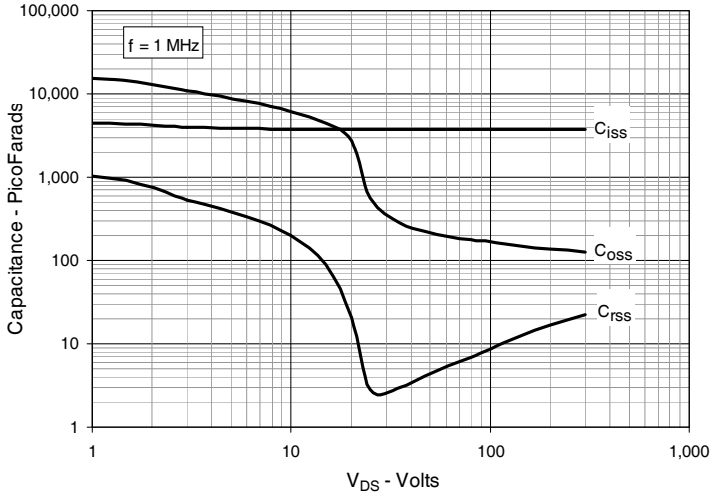
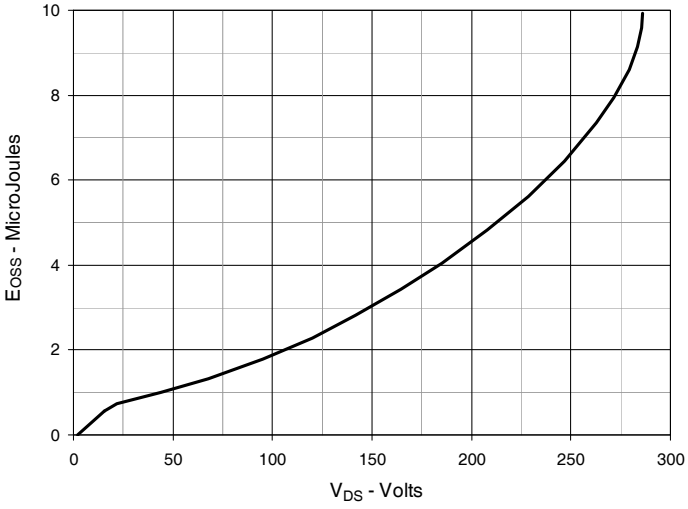


Fig. 12. Output Capacitance Stored Energy



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Fig. 13. Forward-Bias Safe Operating Area

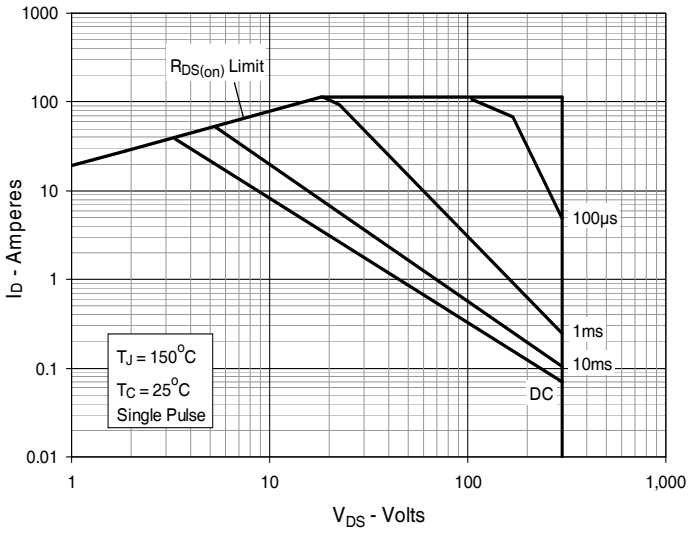
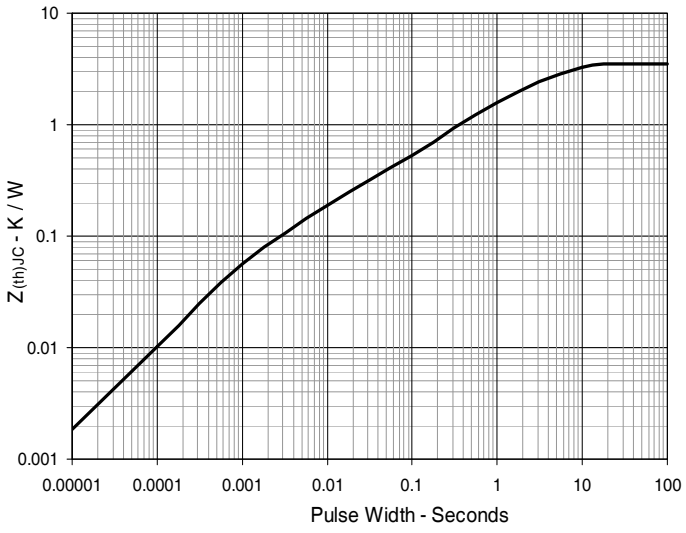


Fig. 14. Maximum Transient Thermal Impedance



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