IXYS

HiPerFET™ Power MOSFETs Q-Class

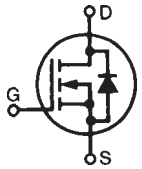
IXFH 23N60Q
IXFT 23N60Q

V_{DSS} = 600 V
I_{D25} = 23 A
$R_{DS(on)}$ = 0.32 Ω

$t_{rr} \leq$ 250ns

N-Channel Enhancement Mode
Avalanche Rated, High dv/dt,
Low Gate Charge and Capacitances

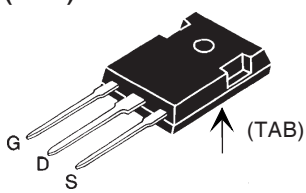
Preliminary Data Sheet



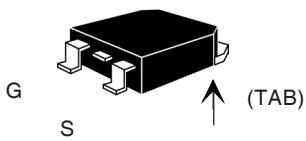
Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	600	V
V_{DGR}	T_J = 25°C to 150°C; R_{GS} = 1 MΩ	600	V
V_{GS}	Continuous	±30	V
V_{GSM}	Transient	±40	V
I_{D25}	T_C = 25°C	23	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}	92	A
I_{AR}	T_C = 25°C	23	A
E_{AR}	T_C = 25°C	30	mJ
E_{AS}	T_C = 25°C	1.5	J
dv/dt	$I_S \leq I_{DM}$, di/dt ≤ 100 A/μs, $V_{DD} \leq V_{DSS}$, $T_J \leq$ 150°C, R_G = 2 Ω	15	V/ns
P_D	T_C = 25°C	400	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	1.6 mm (0.062 in.) from case for 10 s	300	°C
M_d	Mounting torque	1.13/10	Nm/lb.in.
Weight	TO-247 AD	6	g
	TO-268	4	g

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)		Characteristic Values Min.	Typ.	Max.	
V_{DSS}	V_{GS} = 0 V, I_D = 250 μA		600			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 4 mA		2.0		4.5	V
I_{GSS}	V_{GS} = ±30 V_{DC}, V_{DS} = 0				±100	nA
I_{DSS}	$V_{DS} = V_{DSS}$	T_J = 25°C			25	μA
	V_{GS} = 0 V	T_J = 125°C			1	mA
$R_{DS(on)}$	V_{GS} = 10 V, I_D = 0.5 I_{D25} Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %				0.32	Ω

TO-247 AD (IXFH)



TO-268 (IXFT) Case Style



G = Gate D = Drain
S = Source TAB = Drain

Features

- IXYS advanced low gate charge process
- International standard packages
- Low gate charge and capacitance
  - easier to drive
  - faster switching
- Low $R_{DS\ (on)}$
- Unclamped Inductive Switching (UIS) rated
- Molding epoxies meet UL 94 V-0 flammability classification

Advantages

- Easy to mount
- Space savings
- High power density

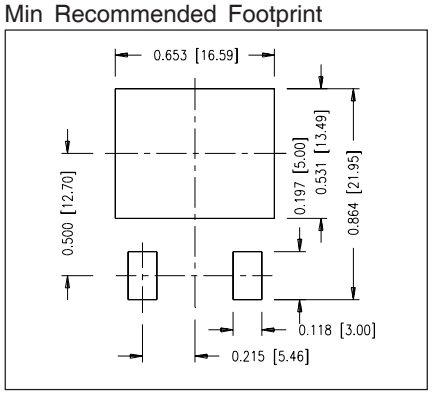
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Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 10 V; I_D = 0.5 I_{D25}, pulse test	10	20		S
C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		3300		pF
C_{oss}			410		pF
C_{rss}			130		pF
$t_{d(on)}$	V_{GS} = 10 V, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25} R_G = 1.5 Ω (External)		20		ns
t_r			20		ns
$t_{d(off)}$			45		ns
t_f			20		ns
$Q_{g(on)}$	V_{GS} = 10 V, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}		90		nC
Q_{gs}			20		nC
Q_{gd}			45		nC
R_{thJC}				0.31	K/W
R_{thCK}	(TO-247)		0.25		K/W

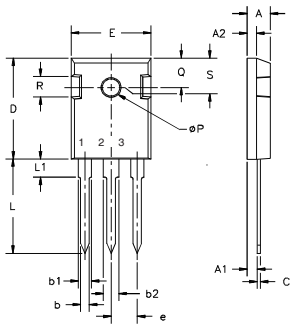
Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values min.	typ.	max.	
I_S	V_{GS} = 0 V			23	A
I_{SM}	Repetitive; pulse width limited by T_{JM}			92	A
V_{SD}	$I_F = I_S$, V_{GS} = 0 V, Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %			1.5	V
t_{rr}	$I_F = I_S$, -di/dt = 100 A/µs, V_R = 100 V			250	ns
Q_{RM}			0.85		µC
I_{RM}			8		A

Min Recommended Footprint



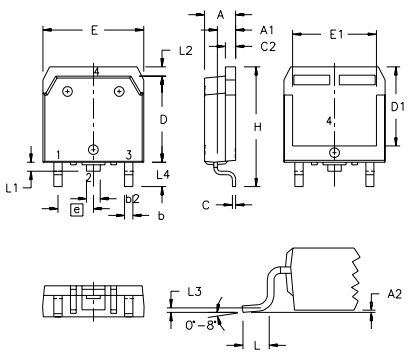
TO-247 AD Outline



Terminals: 1 - Gate 2 - Drain
3 - Source Tab - Drain

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.7	5.3	.185	.209
A_1	2.2	2.54	.087	.102
A_2	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b_1	1.65	2.13	.065	.084
b_2	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
ØP	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15 BSC		242 BSC	

TO-268 Outline



SYM	INCHES MIN	MAX	MILLIMETERS MIN	MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b2	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
e	.215 BSC		5.45 BSC	
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L1	.047	.055	1.20	1.40
L2	.039	.045	1.00	1.15
L3	.010 BSC		0.25 BSC	
L4	.150	.161	3.80	4.10

IXYS 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 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715 6,306,728B1 6,259,123B1 6,306,728B1 4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025 6,404,065B1 6,162,665 6,534,343

Fig. 1. Output Characteristics @ 25 Deg. C

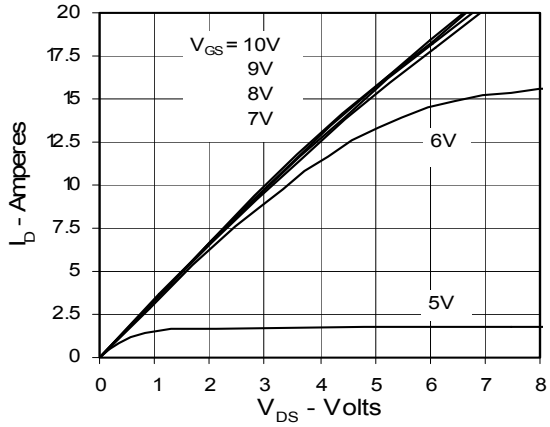


Fig. 2. Extended Output Characteristics @ 25 deg. C

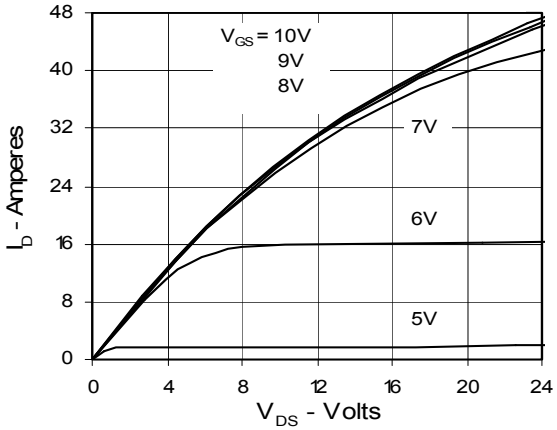


Fig. 3. Output Characteristics @ 125 Deg. C

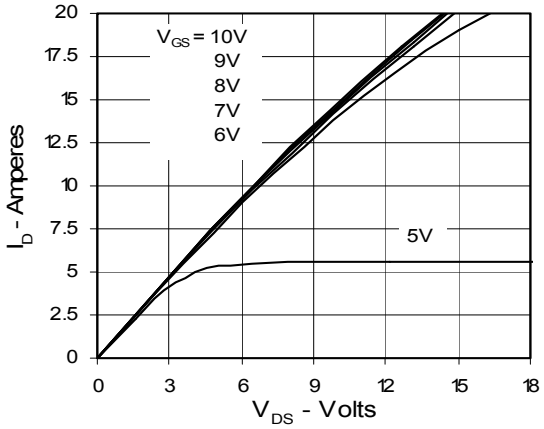


Fig. 4. $R_{DS(on)}$ Normalized to I_{D25} Value vs. Junction Temperature

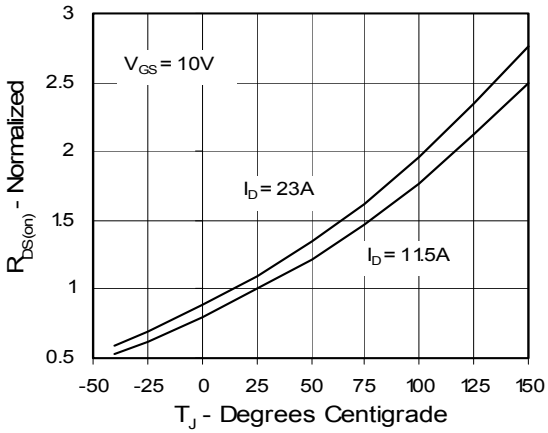


Fig. 5. $R_{DS(on)}$ Normalized to I_{D25} Value vs. I_D

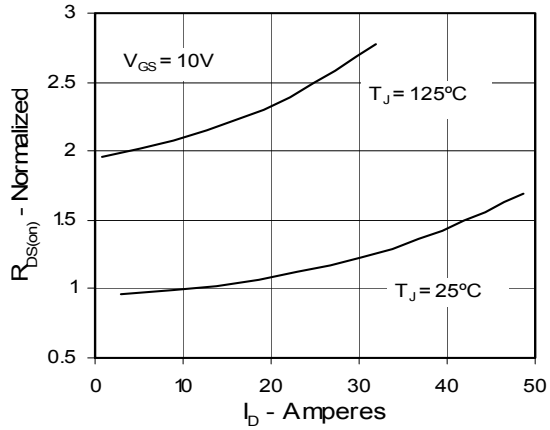
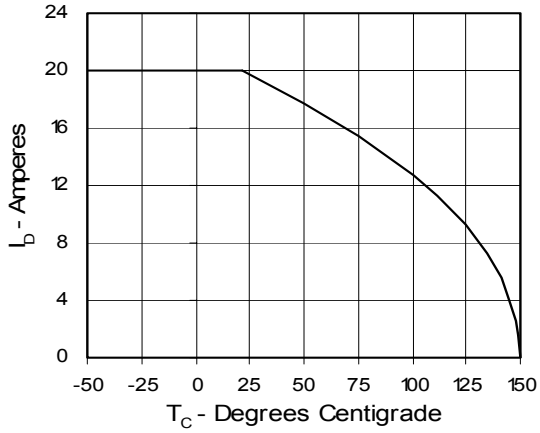


Fig. 6. Drain Current vs. Case Temperature



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Fig. 7. Input Admittance

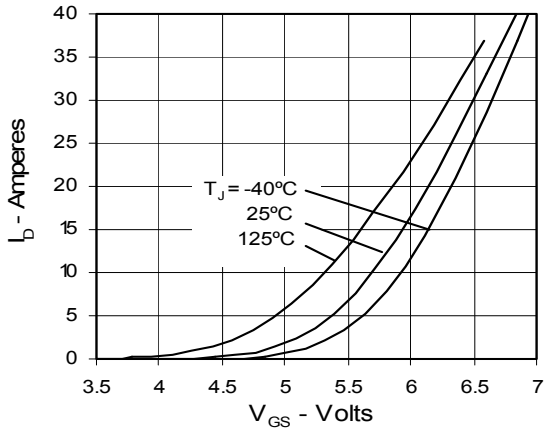


Fig. 8. Transconductance

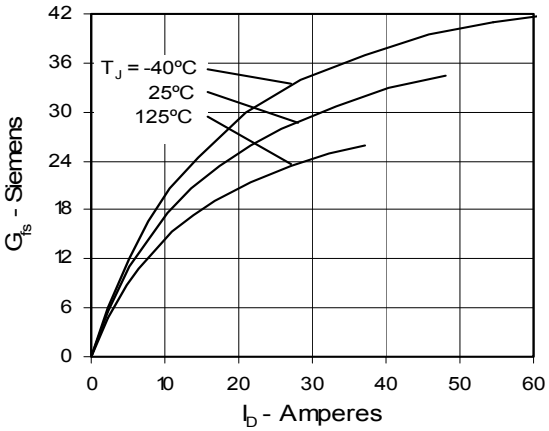


Fig. 9. Source Current vs. Source-To-Drain Voltage

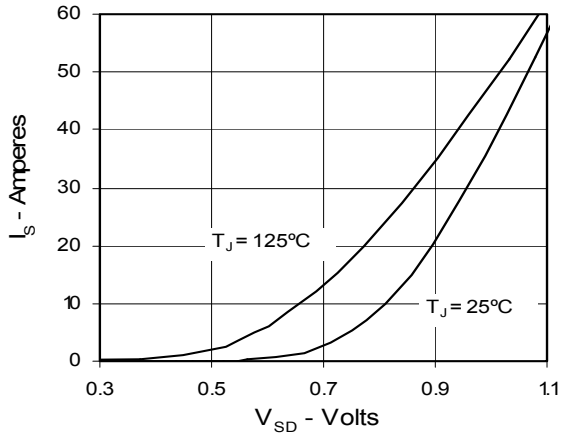


Fig. 10. Gate Charge

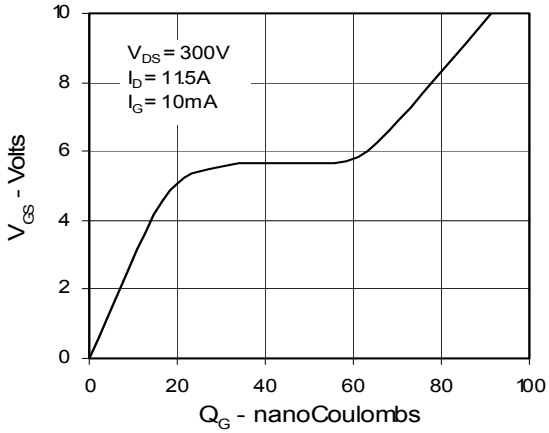


Fig. 11. Capacitance

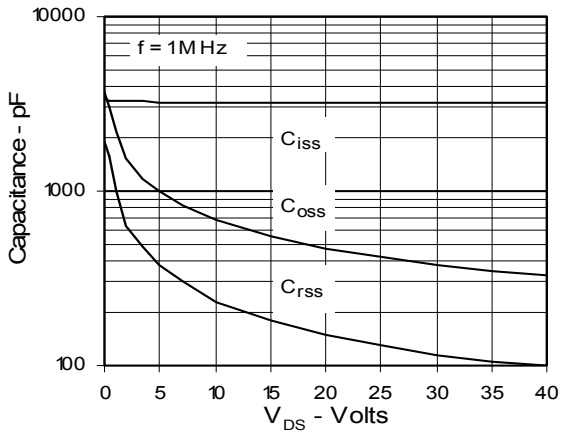
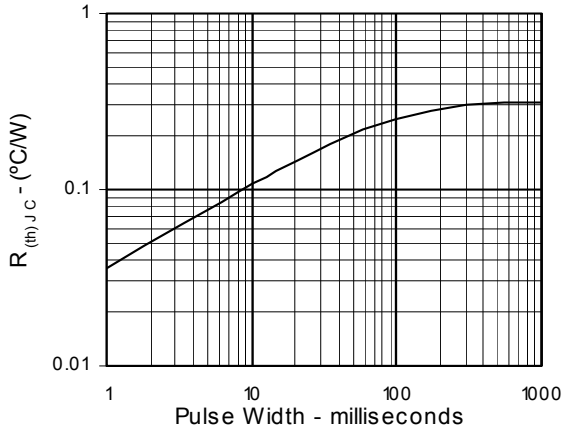


Fig. 12. Maximum Transient Thermal Resistance



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