IXYS

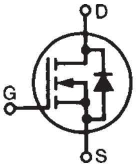
Power MOSFETs
Q-Class

IXTQ 23N60Q

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

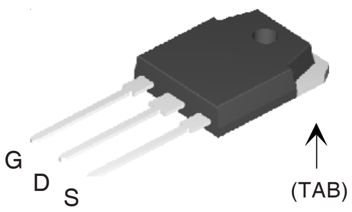
N-Channel Enhancement Mode
Avalanche Rated, High dv/dt,
Low Gate Charge and Capacitances

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	$I_S \le I_{DM}$, di/dt ≤ 100 A/µs, $V_{DD} \le V_{DSS}$, $T_J \le$ 150°C, R_G = 2 Ω	5	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		6	g

TO-3P (IXTQ)



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

Symbol (T_J = 25°C, unless otherwise specified)	Test Conditions		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 = 250 µA		2.5		4.5	V
I_{GSS}	V_{GS} = ±30 V_{DC}, V_{DS} = 0				±100	nA
I_{DSS}	$V_{DS} = V_{DSS}$ V_{GS} = 0 V	T_J = 25°C T_J = 125°C			25 1	µA 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

Features

- IXYS advanced low gate charge process
- International standard package
- 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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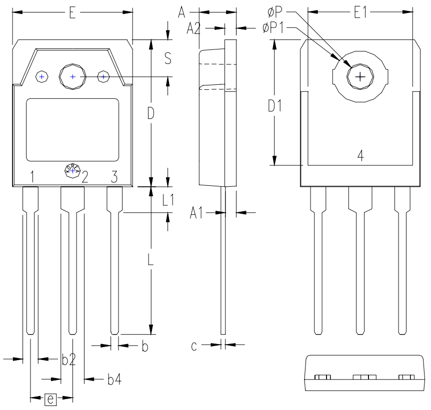
Symbol	**Test Conditions**	**Characteristic Values** (T_J = 25°C, unless otherwise specified) **Min.**	**Typ.**	**Max.**	
g_{fs}	V_{DS} = 10 V; I_D = 0.5 I_{D25}, pulse test	10	20		S
C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		3300		pF
C_{oss}			410		pF
C_{rss}			130		pF
$t_{d(on)}$	V_{GS} = 10 V, 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}			0.25		K/W

TO-3P Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.193	4.70	4.90
A1	.051	.059	1.30	1.50
A2	.057	.065	1.45	1.65
b	.035	.045	0.90	1.15
b2	.075	.087	1.90	2.20
b4	.114	.126	2.90	3.20
c	.022	.031	0.55	0.80
D	.780	.791	19.80	20.10
D1	.665	.677	16.90	17.20
E	.610	.622	15.50	15.80
E1	.531	.539	13.50	13.70
e	.215 BSC		5.45 BSC	
L	.779	.795	19.80	20.20
L1	.134	.142	3.40	3.60
ØP	.126	.134	3.20	3.40
ØP1	.272	.280	6.90	7.10
S	.193	.201	4.90	5.10

All metal area are tin plated.

1 – GATE
2 – DRAIN (COLLECTOR)
3 – SOURCE (EMITTER)
4 – DRAIN (COLLECTOR)

Source-Drain Diode

Symbol	**Test Conditions**	**Characteristic Values** (T_J = 25°C, unless otherwise specified) **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		500		ns

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

Fig. 1. Output Characteristics @ 25 Deg. C

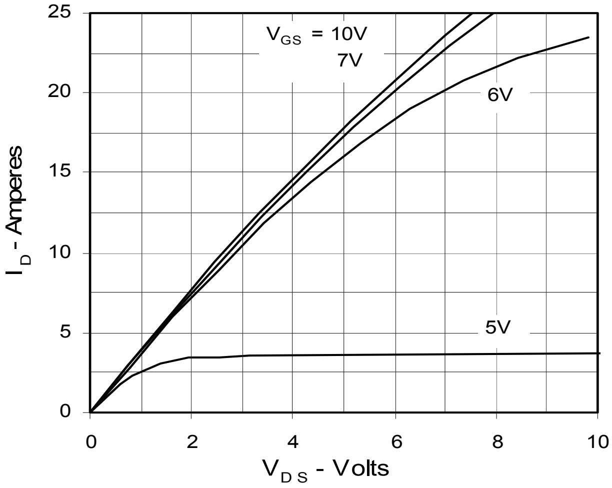


Fig. 2. Extended Output Characteristics @ 25 deg. C

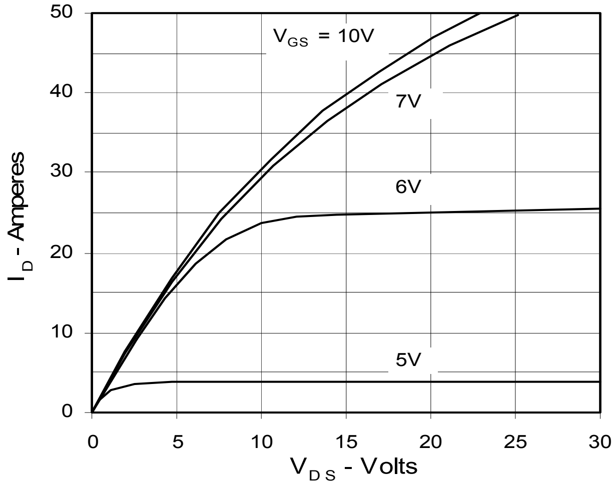


Fig. 3. Output Characteristics @ 125 Deg. C

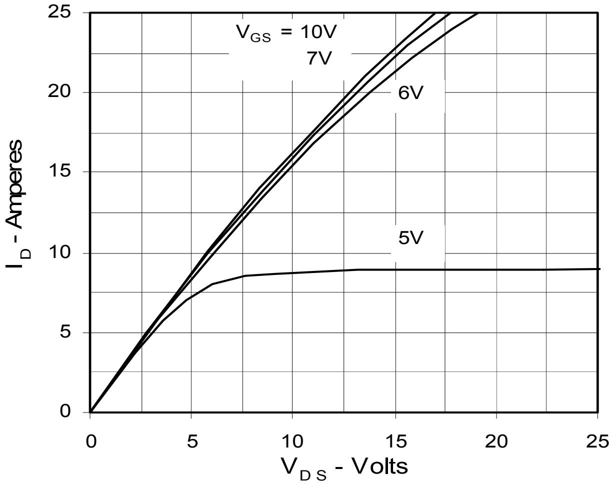


Fig. 4. $R_{DS(on)}$ Normalized to I_{D25} Value vs. Junction Temperature

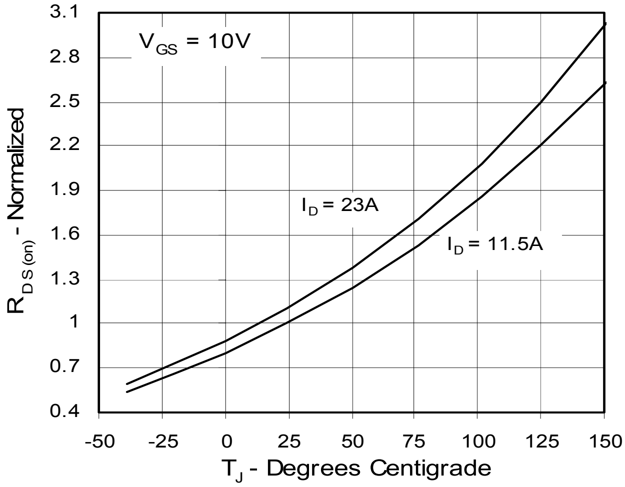


Fig. 5. $R_{DS(on)}$ Normalized to I_{D25} Value vs. I_D

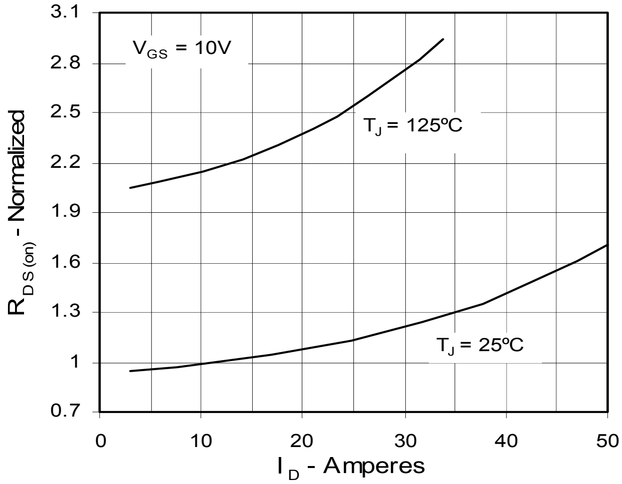


Fig. 6. Drain Current vs. Case Temperature

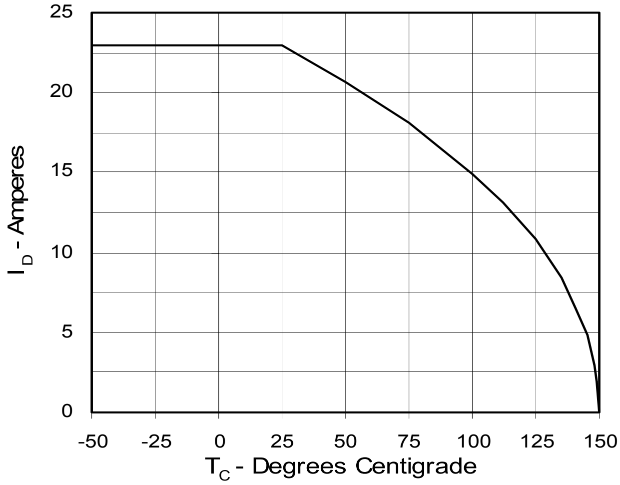


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Fig. 7. Input Admittance

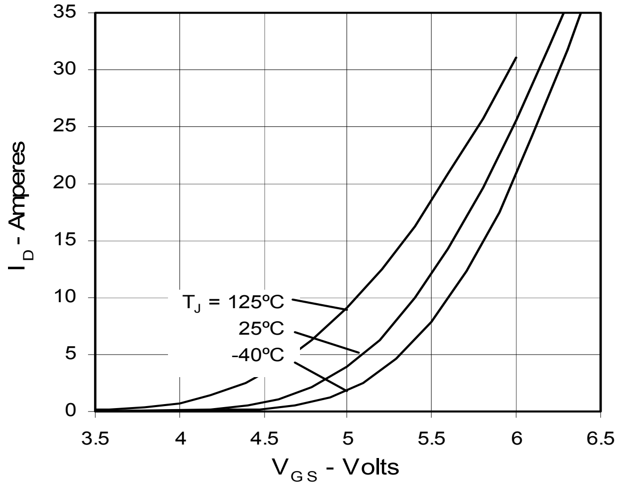


Fig. 8. Transconductance

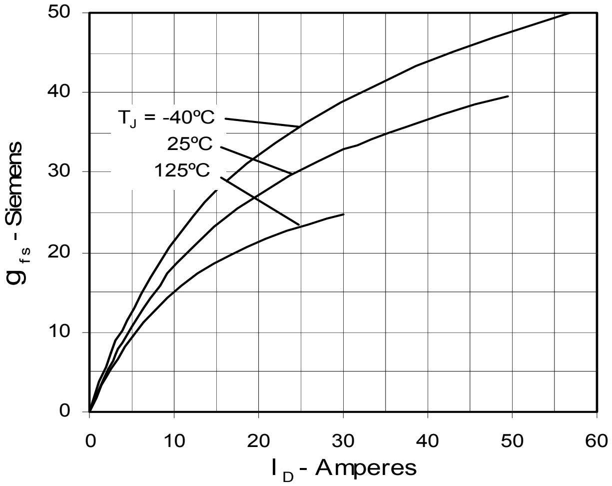


Fig. 9. Source Current vs. Source-To-Drain Voltage

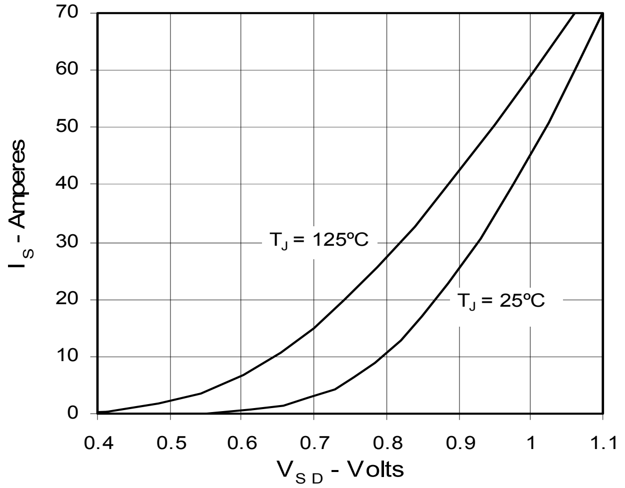


Fig. 10. Gate Charge

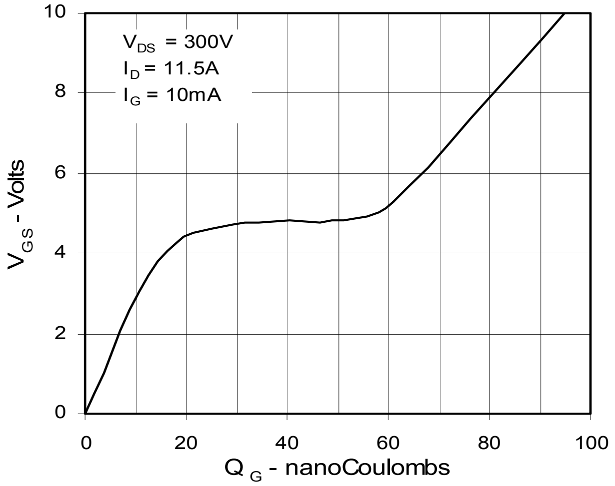


Fig. 11. Capacitance

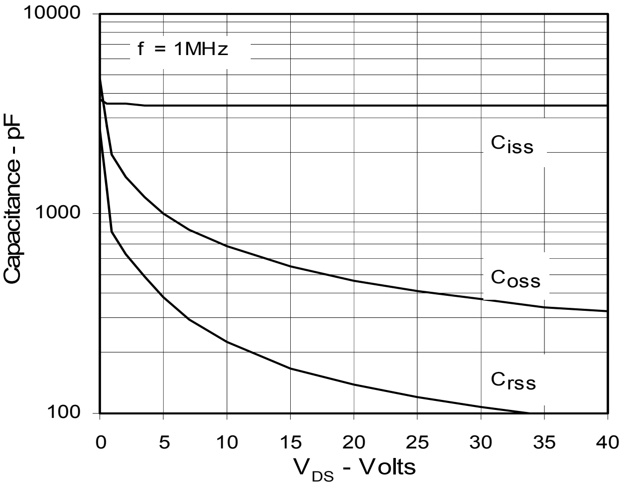
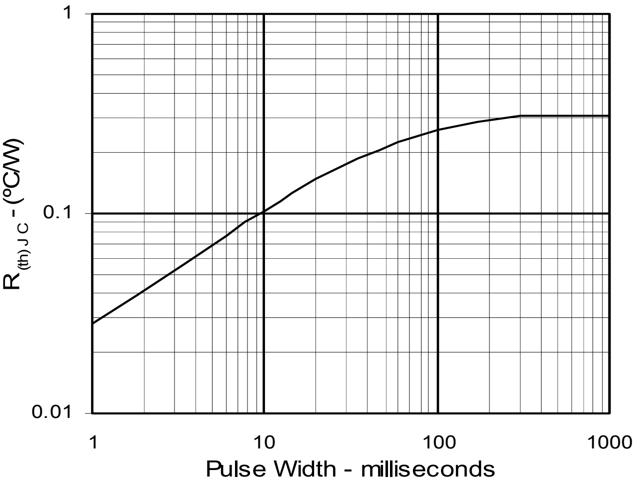


Fig. 12. Maximum Transient Thermal Resistance



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