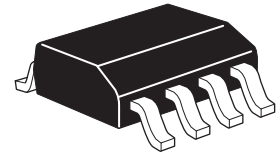


ZXMN6A09DN8

60V SO8 N-channel enhancement mode MOSFET

Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ (Ω)	I_D (A)
60	0.040 @ $V_{GS} = 10V$	5.6
	0.060 @ $V_{GS} = 4.5V$	4.6

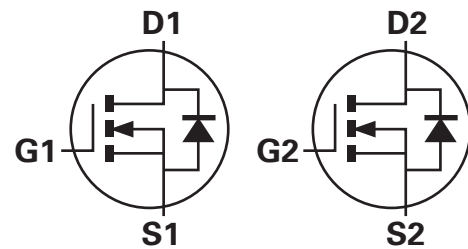


Description

This new generation of trench MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage power management applications.

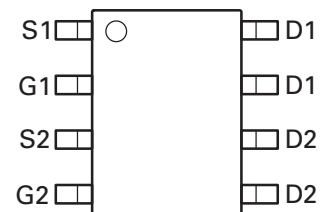
Features

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- SOIC package



Applications

- DC-DC converters
- Power management functions
- Disconnect switches
- Motor control



Top view

Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN6A09DN8TA	7	12	500

Device marking

ZXMN
6A09D

ZXMN6A09DN8

Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Drain-source voltage	V_{DSS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current @ $V_{GS}=10V$; $T_{amb}=25^{\circ}C^{(b)}$	I_D	5.6	A
@ $V_{GS}=10V$; $T_{amb}=70^{\circ}C^{(b)}$		4.5	
@ $V_{GS}=10V$; $T_{amb}=25^{\circ}C^{(a)}$		4.3	
Pulsed drain current ^(c)	I_{DM}	27	A
Continuous source current (body diode) ^(b)	I_S	3.5	A
Pulsed source current (body diode) ^(c)	I_{SM}	27	A
Power dissipation at $T_{amb} = 25^{\circ}C^{(a)(d)}$	P_D	1.25	W
Linear derating factor		10	mW/ $^{\circ}C$
Power dissipation at $T_{amb} = 25^{\circ}C^{(b)(e)}$	P_D	1.8	W
Linear derating factor		14	mW/ $^{\circ}C$
Power dissipation at $T_{amb} = 25^{\circ}C^{(b)(d)}$	P_D	2.1	W
Linear derating factor		17	mW/ $^{\circ}C$
Operating and storage temperature range	T_j, T_{stg}	-55 to +150	$^{\circ}C$

Thermal resistance

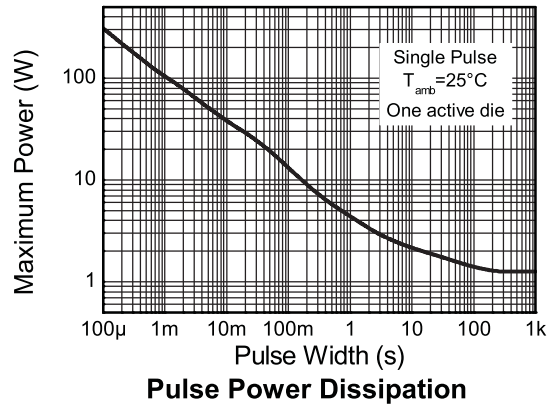
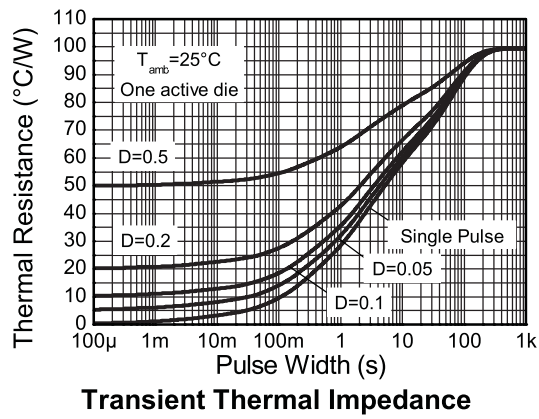
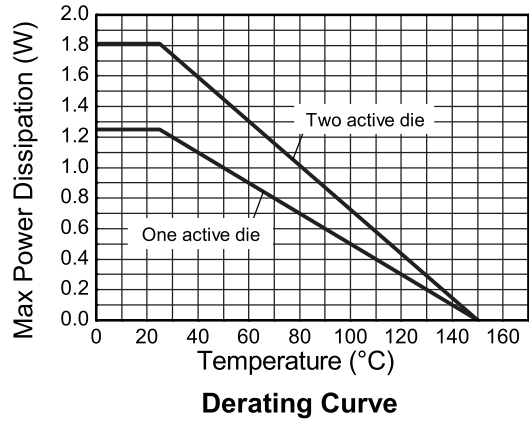
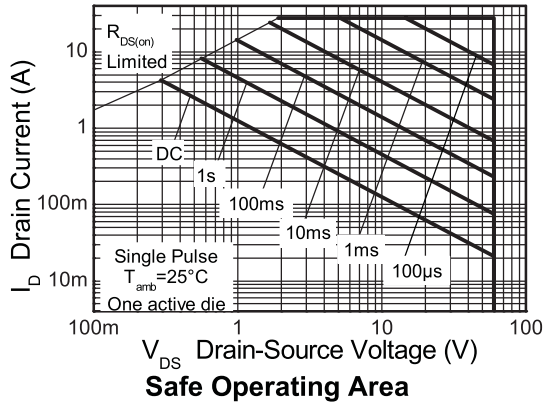
Parameter	Symbol	Limit	Unit
Junction to ambient ^{(a)(d)}	$R_{\theta JA}$	100	$^{\circ}C/W$
Junction to ambient ^{(a)(e)}	$R_{\theta JA}$	70	$^{\circ}C/W$
Junction to ambient ^{(b)(d)}	$R_{\theta JA}$	60	$^{\circ}C/W$

NOTES:

- (a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
- (b) For a device surface mounted on FR4 PCB measured at $t \leq 10$ sec.
- (c) Repetitive rating - 25mm x 25mm FR4 PCB, $D=0.02$, pulse width 300 μ s - pulse width limited by maximum junction temperature.
- (d) For a dual device with one active die.
- (e) For a device with two active die running at equal power.

ZXMN6A09DN8

Characteristics



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Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Static						
Drain-source breakdown voltage	$V_{(BR)DSS}$	60			V	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$
Zero gate voltage drain current	I_{DSS}			1	μA	$V_{DS} = 60\text{V}$, $V_{GS} = 0\text{V}$
Gate-body leakage	I_{GSS}			100	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
Gate-source threshold voltage	$V_{GS(th)}$	1.0		3.0	V	$I_D = 250\mu\text{A}$, $V_{DS} = V_{GS}$
Static drain-source on-state resistance (*)	$R_{DS(on)}$			0.040	Ω	$V_{GS} = 10\text{V}$, $I_D = 8.2\text{A}$
				0.060	Ω	$V_{GS} = 4.5\text{V}$, $I_D = 7.4\text{A}$
Forward transconductance(*) (‡)	g_{fs}		15		S	$V_{DS} = 15\text{V}$, $I_D = 8.2\text{A}$
Dynamic (‡)						
Input capacitance	C_{iss}		1407		pF	$V_{DS} = 40\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output capacitance	C_{oss}		121		pF	
Reverse transfer capacitance	C_{rss}		59		pF	
Switching (†) (‡)						
Turn-on-delay time	$t_{d(on)}$		4.9		ns	$V_{DD} = 15\text{V}$, $I_D = 3.5\text{A}$ $R_G \approx 6.0\Omega$, $V_{GS} = 10\text{V}$
Rise time	t_r		5.0		ns	
Turn-off delay time	$t_{d(off)}$		25.3		ns	
Fall time	t_f		4.6		ns	
Total gate charge	Q_g		12.4		nC	$V_{DS} = 15\text{V}$, $V_{GS} = 5\text{V}$ $I_D = 3.5\text{A}$
Total gate charge	Q_g		24.2		nC	$V_{DS} = 15\text{V}$, $V_{GS} = 5\text{V}$ $I_D = 3.5\text{A}$
Gate-source charge	Q_{gs}		5.2		nC	
Gate drain charge	Q_{gd}		3.5		nC	
Source-drain diode						
Diode forward voltage(*)	V_{SD}		0.85	0.95	V	$T_j = 25^{\circ}\text{C}$, $I_S = 6.6\text{A}$, $V_{GS} = 0\text{V}$
Reverse recovery time(‡)	t_{rr}		26.3		ns	$T_j = 25^{\circ}\text{C}$, $I_S = 3.5\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$
Reverse recovery charge(‡)	Q_{rr}		26.6		nC	

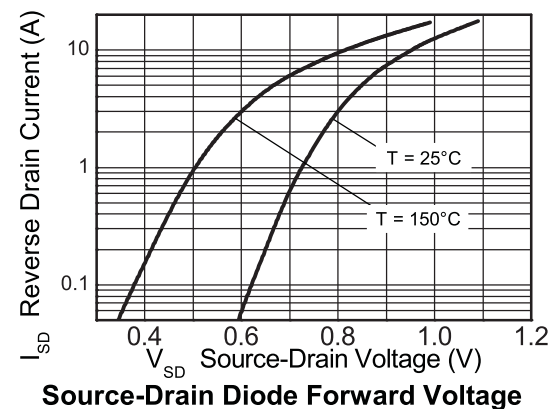
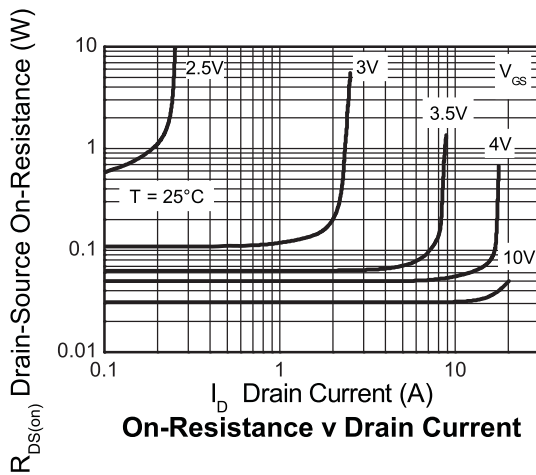
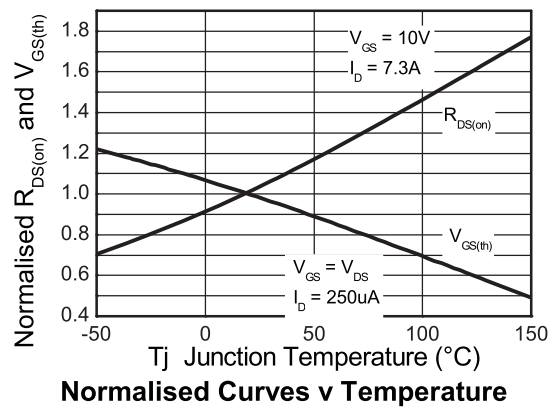
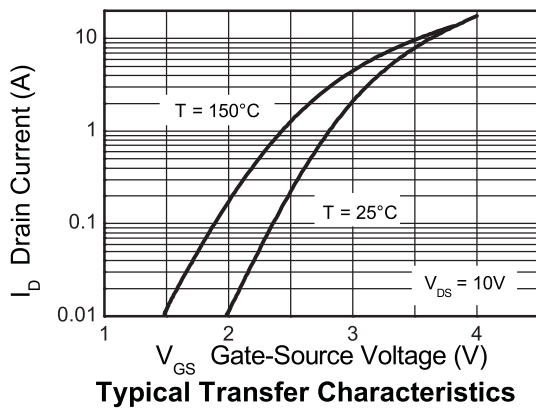
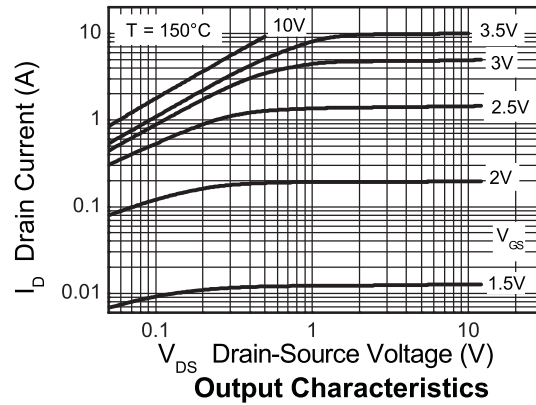
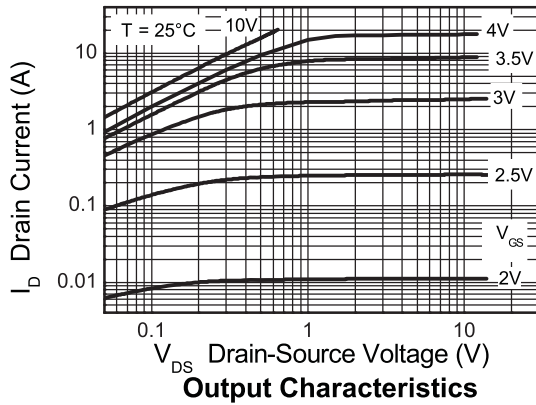
NOTES:

(*) Measured under pulsed conditions. Pulse width $\leq 300\text{ s}$; duty cycle $\leq 2\%$.

(†) Switching characteristics are independent of operating junction temperature.

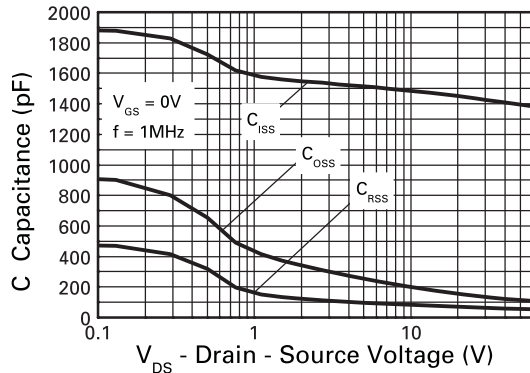
(‡) For design aid only, not subject to production testing.

Typical characteristics

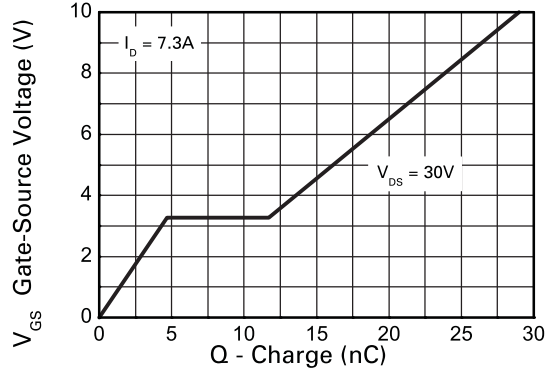


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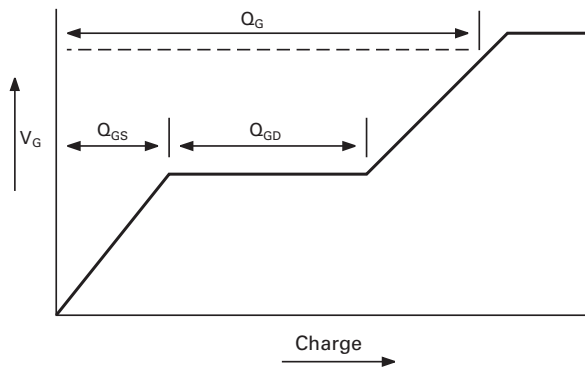
Typical characteristics



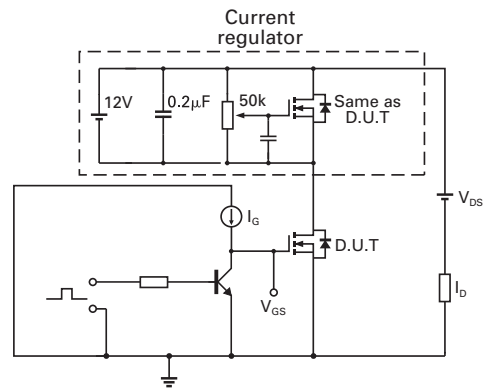
Capacitance v Drain-Source Voltage



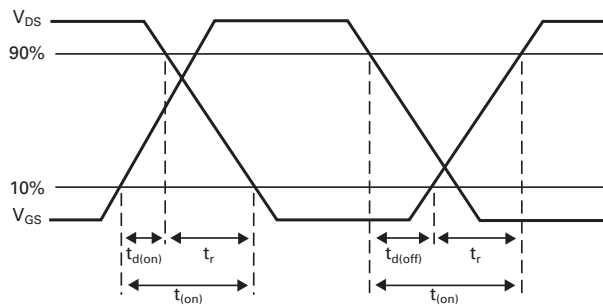
Gate-Source Voltage v Gate Charge



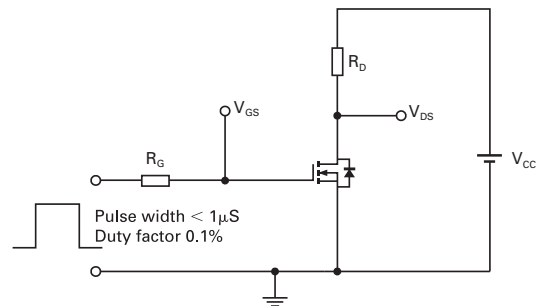
Basic gate charge waveform



Gate charge test circuit



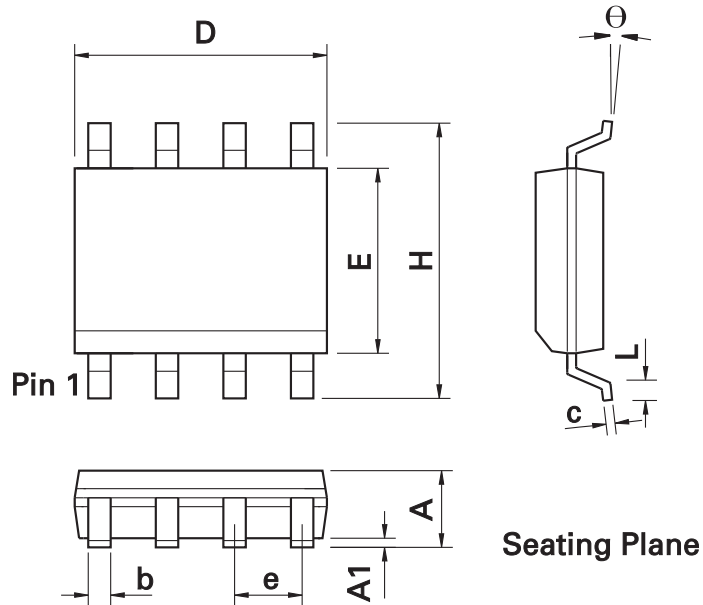
Switching time waveforms



Switching time test circuit

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Package outline - SO8



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.053	0.069	1.35	1.75	e	0.050 BSC		1.27 BSC	
A1	0.004	0.010	0.10	0.25	b	0.013	0.020	0.33	0.51
D	0.189	0.197	4.80	5.00	c	0.008	0.010	0.19	0.25
H	0.228	0.244	5.80	6.20	Θ	0°	8°	0°	8°
E	0.150	0.157	3.80	4.00	h	0.010	0.020	0.25	0.50
L	0.016	0.050	0.40	1.27	-	-	-	-	-

Note: Controlling dimensions are in inches. Approximate dimensions are provided in millimeters

ZXMN6A09DN8

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