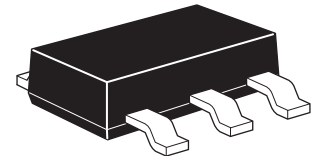


ZXMN6A09G

60V SOT223 N-channel enhancement mode MOSFET

Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ (Ω)	I_D (A)
60	0.040 @ $V_{GS} = 10V$	7.5
	0.060 @ $V_{GS} = 4.5V$	6.2

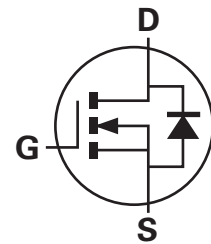


Description

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.

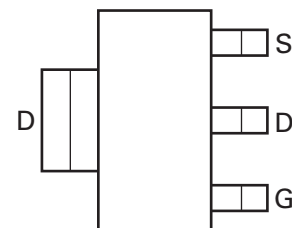
Features

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- SOT223 package



Applications

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



Pinout - top view

Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN6A09GTA	7	12	1000

Device marking

ZXMN
6A09

ZXMN6A09G

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	7.5	A
@ $V_{GS}=10V$; $T_{amb}=70^{\circ}C^{(b)}$		6	
@ $V_{GS}=10V$; $T_{amb}=25^{\circ}C^{(a)}$		5.4	
Pulsed drain current ^(c)	I_{DM}	33	A
Continuous source current (body diode) ^(b)	I_S	3.5	A
Pulsed source current (body diode) ^(c)	I_{SM}	33	A
Power dissipation at $T_{amb}=25^{\circ}C^{(a)}$	P_D	2	W
Linear derating factor		16	mW/ $^{\circ}C$
Power dissipation at $T_{amb}=25^{\circ}C^{(b)}$	P_D	3.9	W
Linear derating factor		31	mW/ $^{\circ}C$
Operating and storage temperature range	T_j, T_{stg}	-55 to +150	$^{\circ}C$

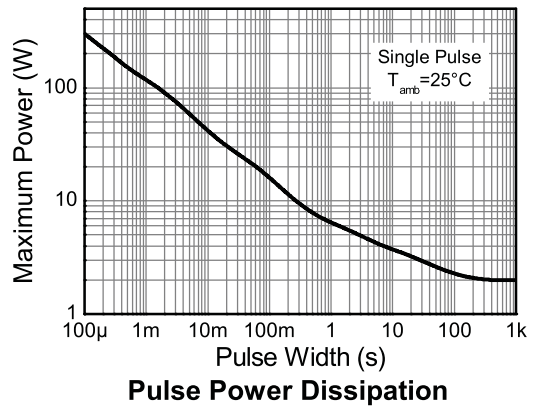
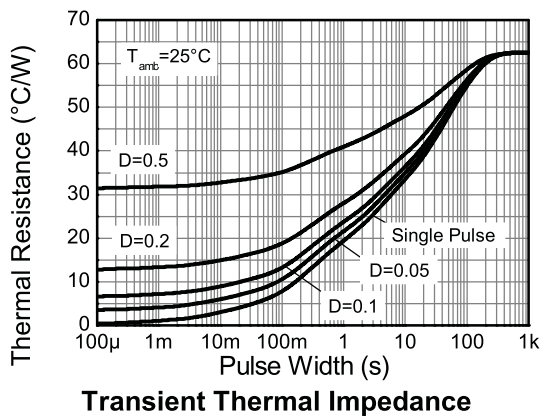
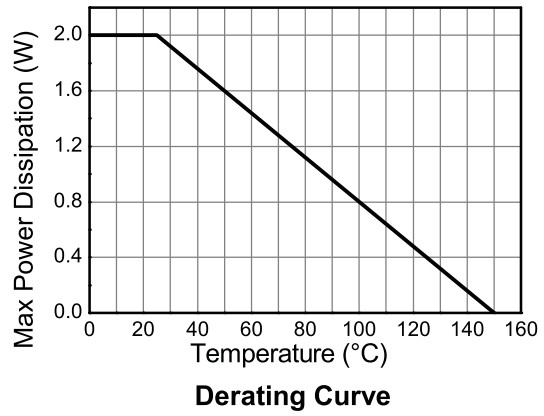
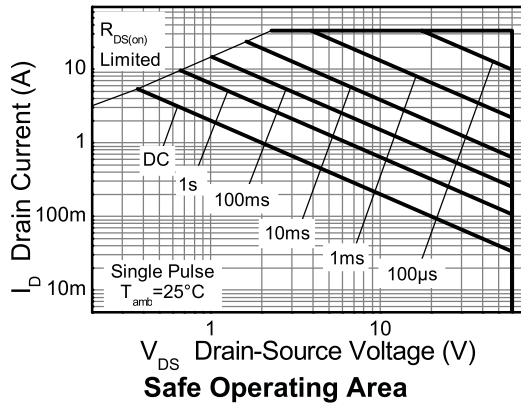
Thermal resistance

Parameter	Symbol	Limit	Unit
Junction to ambient ^(a)	$R_{\theta JA}$	62.5	$^{\circ}C/W$
Junction to ambient ^(b)	$R_{\theta JA}$	32.2	$^{\circ}C/W$

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.

Characteristics



ZXMN6A09G

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	

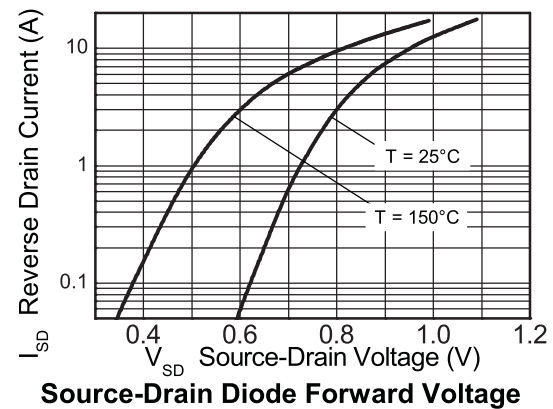
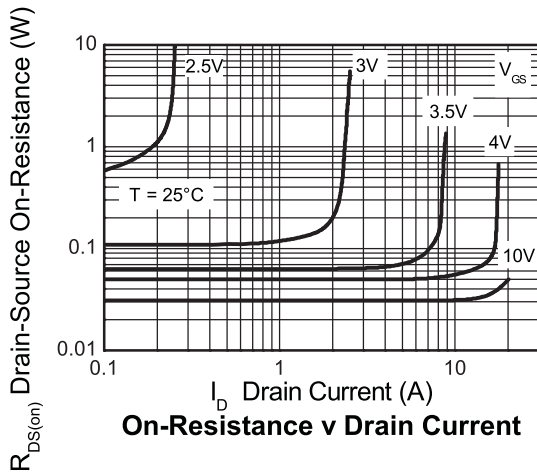
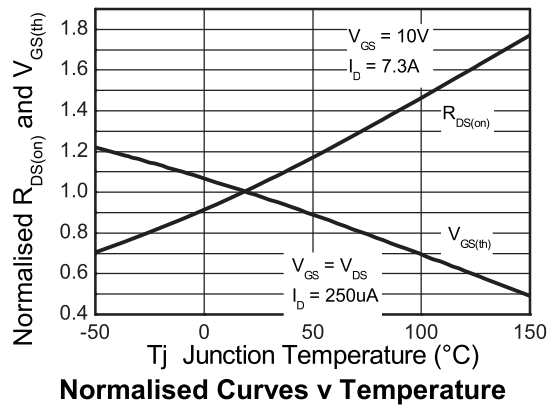
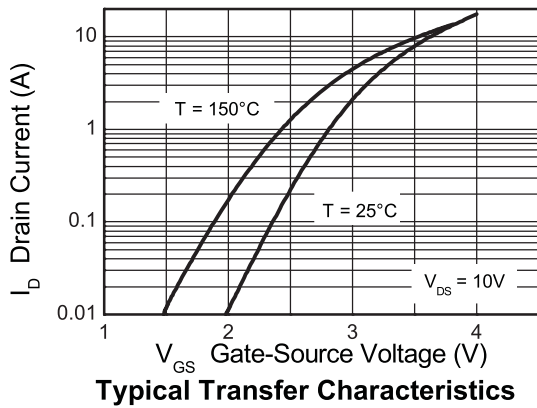
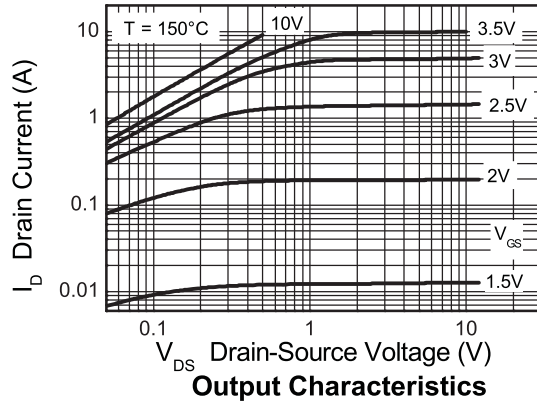
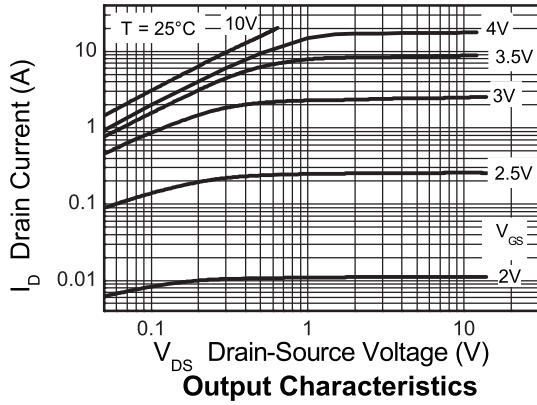
NOTES:

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

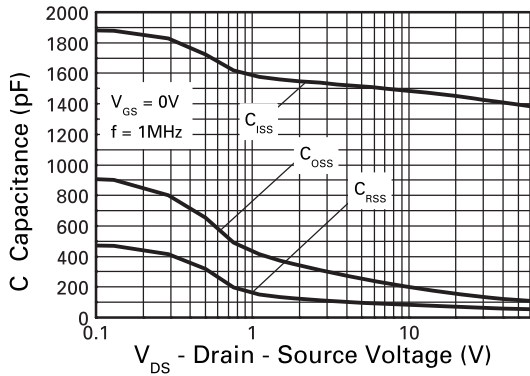
(†) Switching characteristics are independent of operating junction temperature.

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

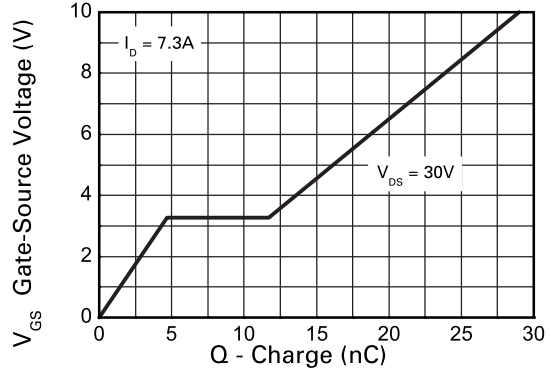
Typical characteristics



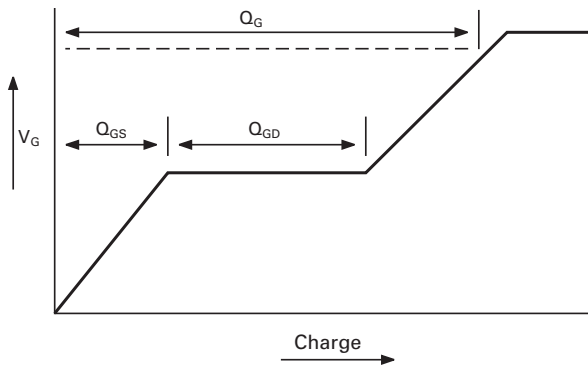
Typical characteristics



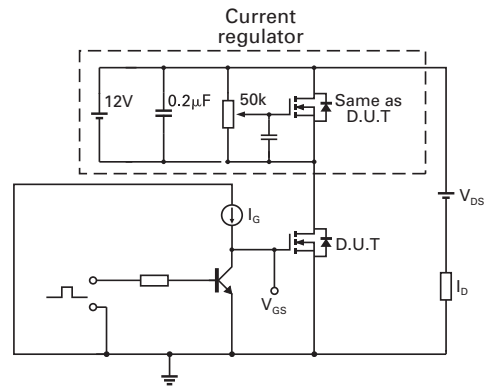
Capacitance v Drain-Source Voltage



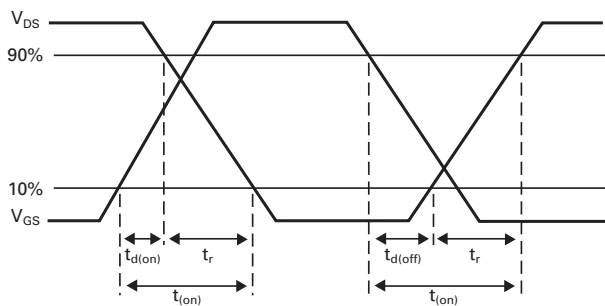
Gate-Source Voltage v Gate Charge



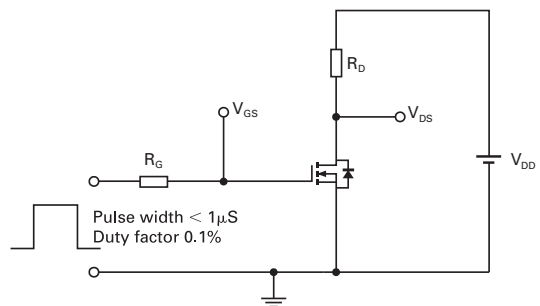
Basic gate charge waveform



Gate charge test circuit



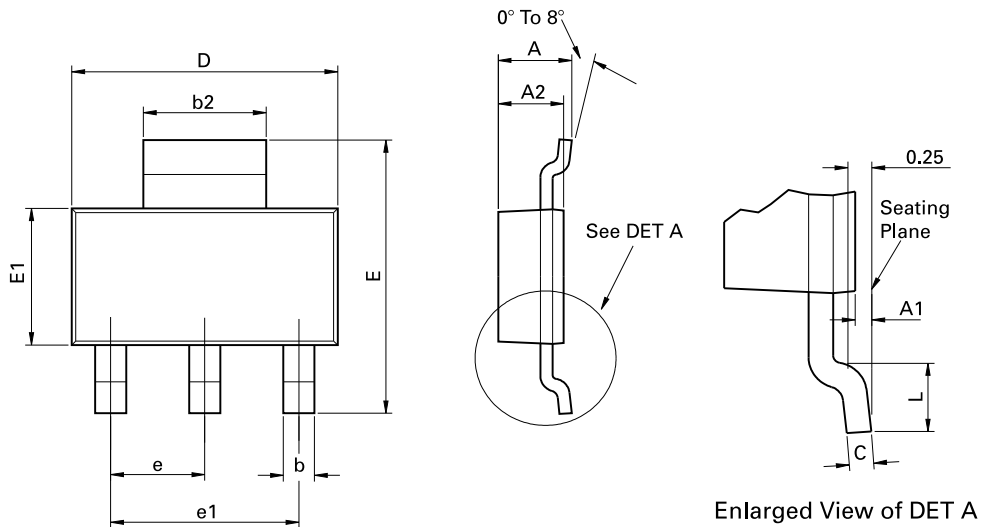
Switching time waveforms



Switching time test circuit

ZXMN6A09G

Package outline - SOT223



Conforms to JEDEC TO-261 AA Issue B

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	-	1.80	-	0.071	e	2.30 BSC		0.0905 BSC	
A1	0.02	0.10	0.0008	0.004	e1	4.60 BSC		0.181 BSC	
b	0.66	0.84	0.026	0.033	E	6.70	7.30	0.264	0.287
b2	2.90	3.10	0.114	0.122	E1	3.30	3.70	0.130	0.146
C	0.23	0.33	0.009	0.013	L	0.90	-	0.355	-
D	6.30	6.70	0.248	0.264	-	-	-	-	-

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

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