

# ZXMN6A09G 60V SOT223 N-channel enhancement mode MOSFET

#### Summary

V <sub>(BR)DSS</sub>	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)	
60	0.040 @ V <sub>GS</sub> = 10V	7.5	
	0.060 @ V <sub>GS</sub> = 4.5V	6.2	



### Description

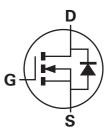
This new generation of trench MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage power management applications.

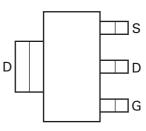
### Features

- 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	Tape width	Quantity
	(inches)	(mm)	per reel
ZXMN6A09GTA	7	12	1000

### **Device marking**

ZXMN 6A09

## Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Drain-source voltage	V <sub>DSS</sub>	60	V
Gate-source voltage	V <sub>GS</sub>	±20	V
Continuous drain current $@V_{GS}=10V; T_{amb}=25^{\circ}C^{(b)}$	۱ <sub>D</sub>	7.5	А
@ V <sub>GS</sub> =10V; T <sub>amb</sub> =70°C <sup>(b)</sup>		6	
@ V <sub>GS</sub> =10V; T <sub>amb</sub> =25°C <sup>(a)</sup>		5.4	
Pulsed drain current <sup>(c)</sup>	I <sub>DM</sub>	33	А
Continuous source current (body diode) <sup>(b)</sup>	ا <sub>S</sub>	3.5	А
Pulsed source current (body diode) <sup>(c)</sup>	I <sub>SM</sub>	33	А
Power dissipation at T <sub>amb</sub> =25°C <sup>(a)</sup>	P <sub>D</sub>	2	W
Linear derating factor		16	mW/°C
Power dissipation at T <sub>amb</sub> =25°C <sup>(b)</sup>	P <sub>D</sub>	3.9	W
Linear derating factor		31	mW/°C
Operating and storage temperature range	T <sub>j</sub> , T <sub>stg</sub>	-55 to +150	°C

## Thermal resistance

Parameter	Symbol	Limit	Unit
Junction to ambient <sup>(a)</sup>	$R_{\ThetaJA}$	62.5	°C/W
Junction to ambient <sup>(b)</sup>	$R_{\ThetaJA}$	32.2	°C/W

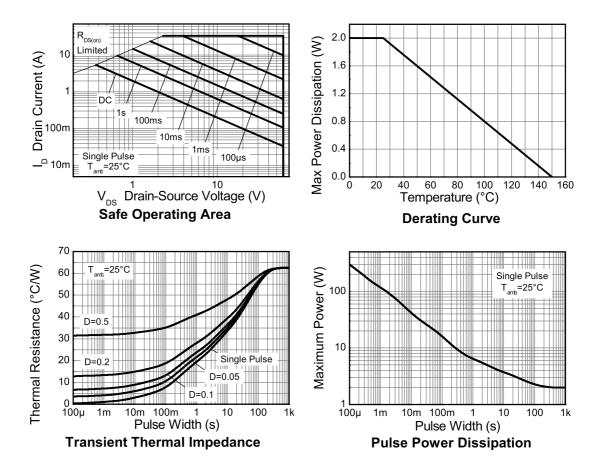
#### NOTES:

(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=300μs - pulse width limited by maximum junction temperature.

### Characteristics



Parameter	Symbol	Min.	Тур.	Max.	Unit	Conditions
Static	l	1				
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	60			V	I <sub>D</sub> = 250μA, V <sub>GS</sub> =0V
Zero gate voltage drain current	I <sub>DSS</sub>			1	μA	V <sub>DS</sub> = 60V, V <sub>GS</sub> =0V
Gate-body leakage	I <sub>GSS</sub>			100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Gate-source threshold voltage	V <sub>GS(th)</sub>	1.0		3.0	V	$I_D=250\mu A, V_{DS}=V_{GS}$
Static drain-source on-state	R <sub>DS(on)</sub>			0.040	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 8.2A
resistance <sup>(*)</sup>				0.060	Ω	$V_{GS}$ = 4.5V, $I_{D}$ = 7.4A
Forward transconductance <sup>(*)(‡)</sup>	9 <sub>fs</sub>		15		S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 8.2A
Dynamic <sup>(‡)</sup>						
Input capacitance	C <sub>iss</sub>		1407		pF	V <sub>DS</sub> = 40V, V <sub>GS</sub> =0V
Output capacitance	C <sub>oss</sub>		121		pF	f=1MHz
Reverse transfer capacitance	C <sub>rss</sub>		59		pF	
Switching <sup>(†)</sup> <sup>(‡)</sup>		•	•	•		
Turn-on-delay time	t <sub>d(on)</sub>		4.9		ns	V <sub>DD</sub> = 15V, I <sub>D</sub> = 3.5A
Rise time	t <sub>r</sub>		5.0		ns	R <sub>G</sub> ≅6.0Ω, V <sub>GS</sub> = 10V
Turn-off delay time	t <sub>d(off)</sub>		25.3		ns	
Fall time	t <sub>f</sub>		4.6		ns	
Total gate charge	Qg		12.4		nC	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 5V I <sub>D</sub> = 3.5A
Total gate charge	Qg		24.2		nC	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 5V
Gate-source charge	Q <sub>gs</sub>		5.2		nC	I <sub>D</sub> = 3.5A
Gate drain charge	0 <sub>gd</sub>		3.5		nC	1
Source-drain diode			•	•		
Diode forward voltage <sup>(*)</sup>	V <sub>SD</sub>		0.85	0.95	V	T <sub>j</sub> =25°C, I <sub>S</sub> = 6.6A, V <sub>GS</sub> =0V
Reverse recovery time <sup>(‡)</sup>	t <sub>rr</sub>		26.3		ns	T <sub>j</sub> =25°C, I <sub>S</sub> = 3.5A,
Reverse recovery charge <sup>(‡)</sup>	0 <sub>rr</sub>		26.6		nC	di/dt=100A/μs

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

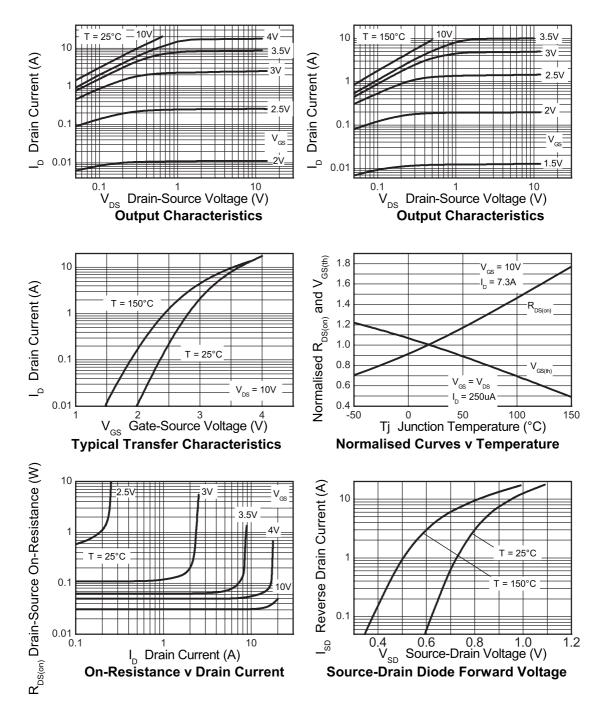
#### NOTES:

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

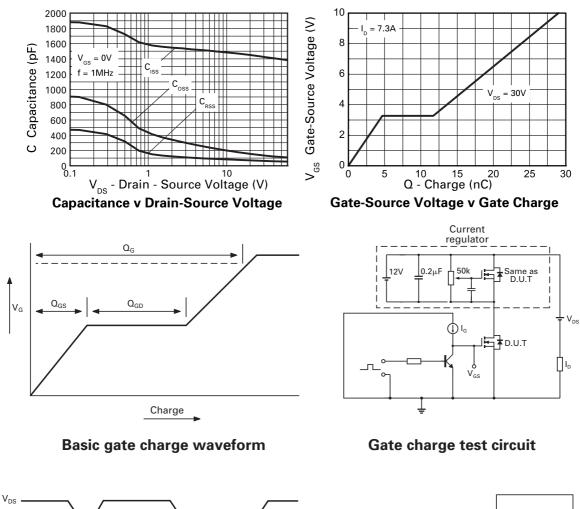
(†) Switching characteristics are independent of operating junction temperature.

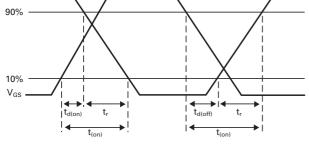
(‡) For design aid only, not subject to production testing.

### **Typical characteristics**



## **Typical characteristics**



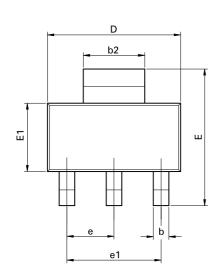


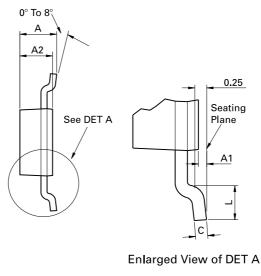
Switching time waveforms

R<sub>D</sub>

Switching time test circuit

## Package outline - SOT223





Conforms to JEDEC TO-261 AA Issue B

DIM	Millin	neters	Inc	hes	DIM	Millimeters		Inches	
	Min	Мах	Min	Max		Min	Мах	Min	Мах
Α	-	1.80	-	0.071	е	2.30	BSC	0.090	5 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
С	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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