



ZXMN6A09G

#### **Product Summary**

V <sub>(BR)DSS</sub>	R <sub>ds(on)</sub>	Ι <sub>D</sub> T <sub>A</sub> = +25°C
60V	$0.04\Omega$ @ V <sub>GS</sub> = 10V	7.5A
007	$0.06\Omega @ V_{GS} = 4.5V$	6.2A

#### Description

This new generation trench MOSFET features a unique structure combining the benefits of low on-resistance and fast switching, making it ideal for high efficiency power management applications.

#### **Applications**

- DC-DC Converters
- Power Management Functions
- Disconnect Switches
- Motor Control

#### 60V N-CHANNEL ENHANCEMENT MODE MOSFET

#### **Features and Benefits**

- High Voltage
- Low On-resistance
- Fast Switching Speed
- Low Gate Drive
- Low Threshold
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability

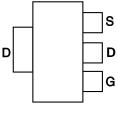
#### **Mechanical Data**

- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.112 grams (Approximate)

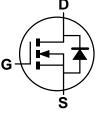


**SOT223** 

Top View



Pin Out - Top



Equivalent Circuit

#### Ordering Information (Note 4)

2					
	Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
	ZXMN6A09GTA	ZXMN6A09	7	12	1,000

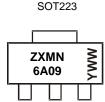
Notes: 1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.

2. See http://www.diodes.com/quality/lead\_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.

3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

4. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

## **Marking Information**



 $\label{eq:2XMN6A09} \begin{array}{l} \mbox{Product Type Marking Code} \\ \mbox{YWW} = \mbox{Date Code Marking} \\ \mbox{Y or } \overline{Y} = \mbox{Last Digit of Year (ex: 5 = 2015)} \\ \mbox{WW or } \overline{WW} = \mbox{Week Code (01~53)} \end{array}$ 

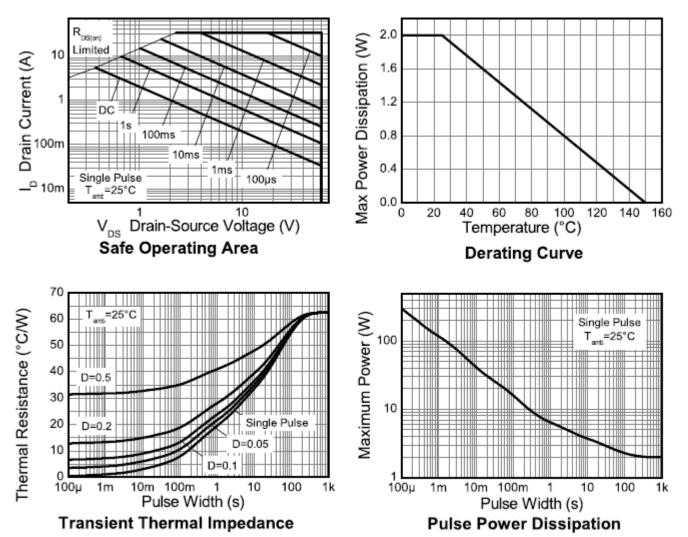


#### Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	60	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current @V <sub>GS</sub> = 10V; $T_A = +25^{\circ}C$ (Note 6) @V <sub>GS</sub> = 10V; $T_A = +70^{\circ}C$ (Note 6) @V <sub>GS</sub> = 10V; $T_A = +25^{\circ}C$ (Note 5)	Ι <sub>D</sub>	7.5 6 5.4	А
Pulsed Drain Current (Note 7)	IDM	33	A
Continuous Source Current (Body Diode) (Note 6)	Is	3.5	A
Pulsed Source Current (Body Diode) (Note 7)	I <sub>SM</sub>	33	А

Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation at $T_A = +25^{\circ}C$ (Note 5) Linear Derating Factor	PD	2.0 16	W mW/°C
Power Dissipation at $T_A = +25^{\circ}C$ (Note 6) Linear Derating Factor	PD	3.9 31	W mW/°C
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>0JA</sub>	62.5	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>0JA</sub>	32.2	°C/W
Operating and Storage Temperature Range	TJ, TSTG	-55 to +150	°C





## Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	-	-	V	$V_{GS} = 0V, I_D = 250 \mu A$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	1	μA	$V_{DS} = 60V, V_{GS} = 0V$	
Gate-Source Leakage	I <sub>GSS</sub>	-	-	100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$	
ON CHARACTERISTICS							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	-	3	V	$V_{DS} = V_{GS}$ , $I_D = 250 \mu A$	
Static Drain-Source On-Resistance (Note 8)	D	-	-	0.04	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 8.2A	
	R <sub>DS(ON)</sub>	-	-	0.06	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 7.4A	
Forward Transconductance (Notes 8 & 10)	<b>g</b> fs	-	15	-	mS	V <sub>DS</sub> = 15V, I <sub>D</sub> = 8.2A	
Diode Forward Voltage (Note 8)	V <sub>SD</sub>	-	0.85	0.95	V	$I_S = 6.6A, V_{GS} = 0V, T_J = +25^{\circ}C$	
DYNAMIC CHARACTERISTICS							
Input Capacitance (Note 10)	C <sub>iss</sub>	I	1407	I	pF	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V, f = 1.0MHz	
Output Capacitance (Note 10)	C <sub>oss</sub>	-	121	-	pF		
Reverse Transfer Capacitance (Note 10)	C <sub>rss</sub>	-	59	-	pF		
Total Gate Charge (Notes 9 & 10) $V_{GS} = 5V$	Qg	-	12.4	-	nC		
Total Gate Charge (Notes 9 & 10) $V_{GS} = 10V$	Qg	-	24.2	-	nC	V <sub>DS</sub> = 15V	
Gate-Source Charge (Notes 9 & 10)	Q <sub>gs</sub>	-	5.2	-	nC	I <sub>D</sub> = 3.5A	
Gate-Drain Charge (Notes 9 &10)	Q <sub>gd</sub>	-	3.5	-	nC	1	
Turn-On Delay Time (Notes 9 & 10)	t <sub>D(ON)</sub>	-	4.9	-	ns		
Turn-On Rise Time (Note 9 & 10)	t <sub>R</sub>	-	5.0	-	ns		
Turn-Off Delay Time (Notes 9 & 10)	t <sub>D(OFF)</sub>	-	25.3	-	ns	V <sub>DD</sub> = 15V, I <sub>D</sub> = 3.5A, V <sub>GS</sub> = 5V	
Turn-Off Fall Time (Notes 9 & 10)	tF	-	4.6	-	ns	1	
Reverse Recovery Time (Note 10)	t <sub>RR</sub>	-	26.3	-	ns	I <sub>F</sub> = 3.5A, di/dt = 100A/µs,	
Reverse Recovery Charge (Note 10)	Qrr	-	26.6	-	nC	T <sub>J</sub> = +25°C	

5. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
6. For a device surface mounted on FR4 PCB measured at t ≤ 10 secs.
7. Repetitive rating 25mm x 25mm FR4 PCB, D=0.02 pulse width=300µs - pulse width limited by maximum junction temperature. Notes:

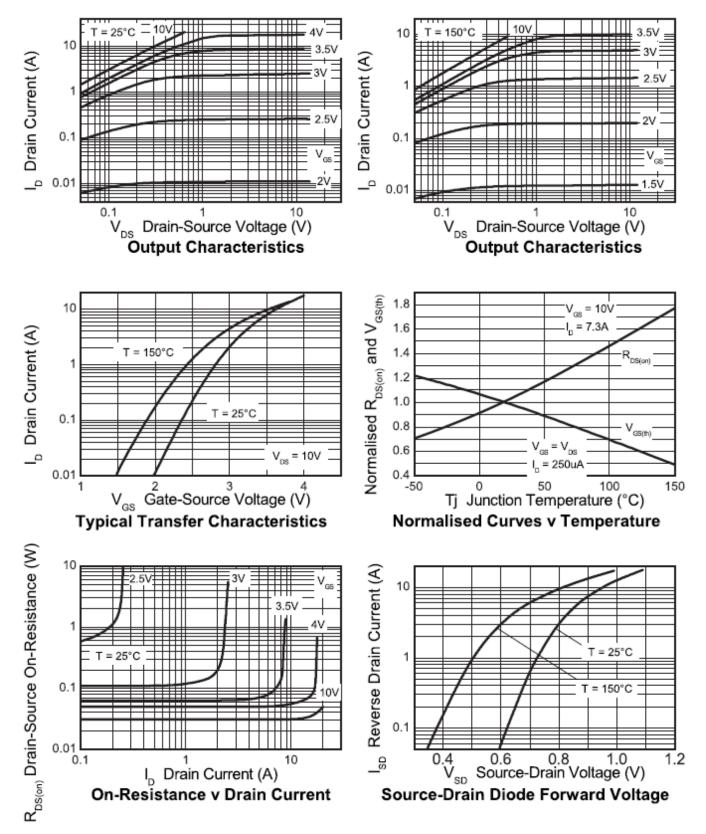
8. Measured under pulsed conditions. Pulse width  $\leq$  300µs; duty cycle  $\leq$  2%.

9. Switching characteristics are independent of operating junction temperature.

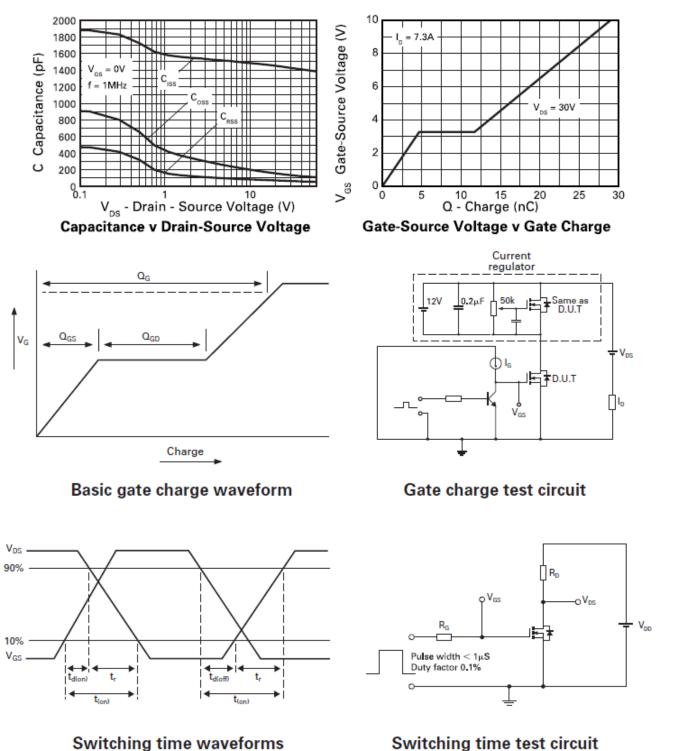
10. For design aid only, not subject to production testing.



## ZXMN6A09G



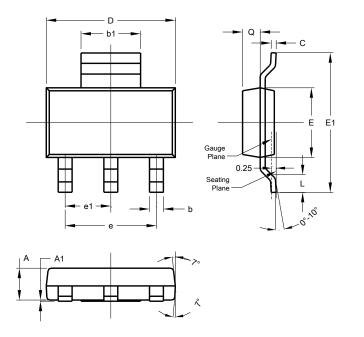






## **Package Outline Dimensions**

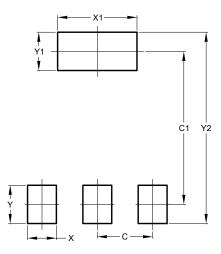
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



SOT223				
Dim	Min	Max	Тур	
Α	1.55	1.65	1.60	
A1	0.010	0.15	0.05	
b	0.60	0.80	0.70	
b1	2.90	3.10	3.00	
С	0.20	0.30	0.25	
D	6.45	6.55	6.50	
Е	3.45	3.55	3.50	
E1	6.90	7.10	7.00	
е	-	-	4.60	
e1	-	-	2.30	
L	0.85	1.05	0.95	
Q	0.84	0.94	0.89	
All I	All Dimensions in mm			

# Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
С	2.30
C1	6.40
Х	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00



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