

**ZXMN6A11G**

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

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ $T_A = +25^\circ C$
60V	120mΩ @ $V_{GS} = 10V$	4.4A
	180mΩ @ $V_{GS} = 4.5V$	3.5A

**Features and Benefits**

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

**Description and Applications**

This MOSFET is designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

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

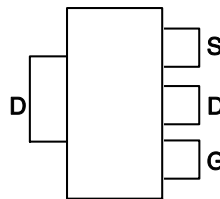
**Mechanical Data**

- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208
- Weight: 0.112 grams (Approximate)

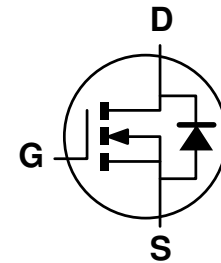
SOT223



Top View



Pin Out - Top



Equivalent Circuit

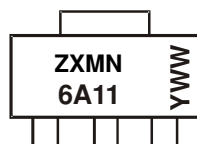
**Ordering Information (Note 4)**

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN6A11GTA	See below	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](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**

SOT223



ZXMN6A11 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 5= 2015)  
 WW or  $\bar{W}W$  = Week Code (01~53)

## Maximum Ratings (@ $T_A = +25^\circ\text{C}$ unless otherwise specified.)

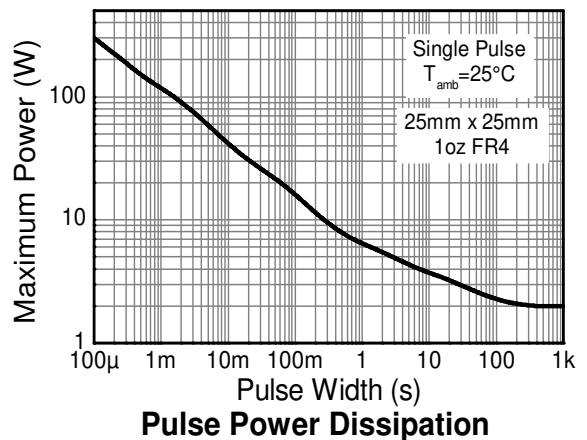
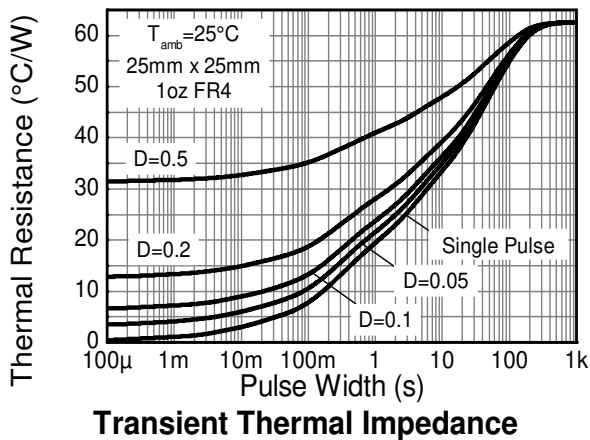
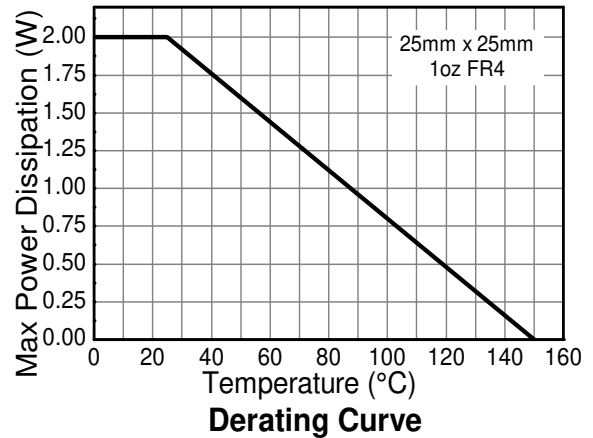
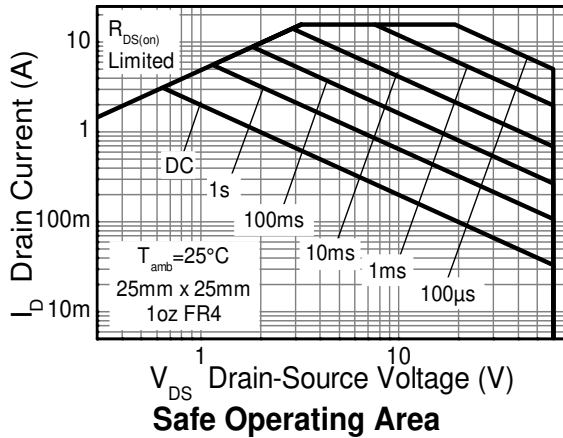
Characteristic			Symbol	Value	Units	
Drain-Source Voltage			$V_{DSS}$	60	V	
Gate-Source Voltage			$V_{GS}$	$\pm 20$		
Continuous Drain Current	$V_{GS} = 10\text{V}$	(Note 6)	$I_D$	4.4	A	
		$T_A = +70^\circ\text{C}$ (Note 6) (Note 5)		3.5 3.1		
Pulsed Drain Current	$V_{GS} = 10\text{V}$	(Note 7)	$I_{DM}$	15.6		
Continuous Source Current (Body Diode)			(Note 6)	$I_S$		5
Pulsed Source Current (Body Diode)			(Note 7)	$I_{SM}$		15.6

## Thermal Characteristics (@ $T_A = +25^\circ\text{C}$ unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	$P_D$	2.0	W
	(Note 6)		16	
Linear Derating Factor	(Note 6)		3.9	mW/ $^\circ\text{C}$
	(Note 5)		31	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
	(Note 6)		32.0	
Thermal Resistance, Junction to Lead	(Note 8)	$R_{\theta JL}$	9.8	
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

- Notes:
5. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  6. Same as Note 5, except the device is measured at  $t \leq 10$  seconds.
  7. Same as Note 5, except the device is pulsed with  $D = 0.02$  and pulse width 300 $\mu\text{s}$ .
  8. Thermal resistance from junction to solder-point (at the end of the drain lead).

**Thermal Characteristics**

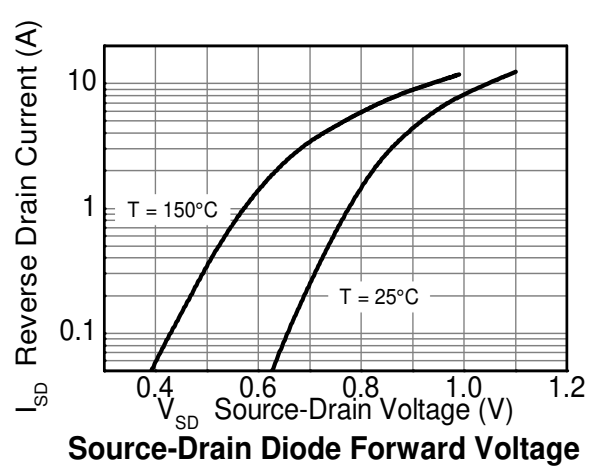
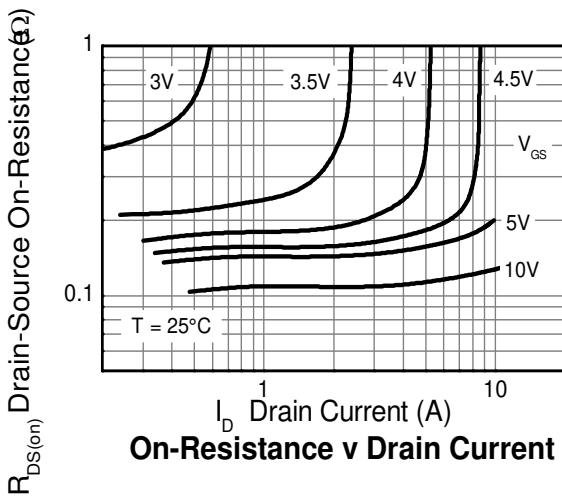
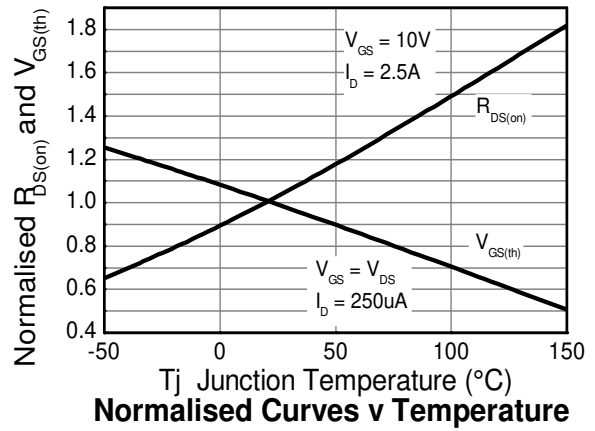
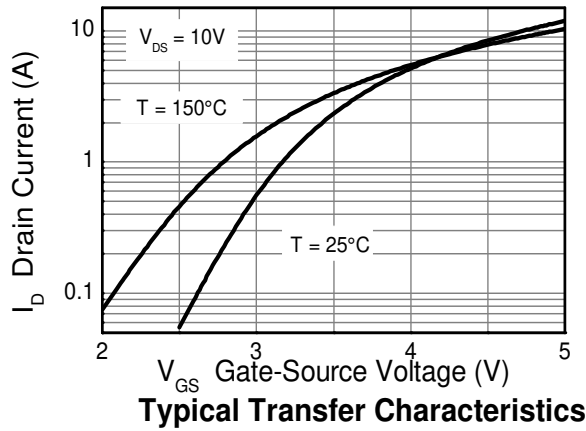
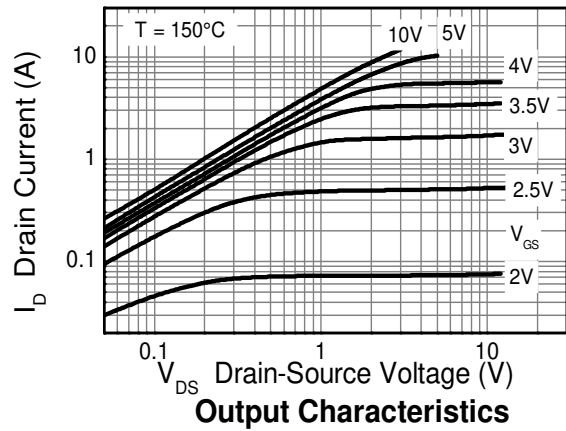
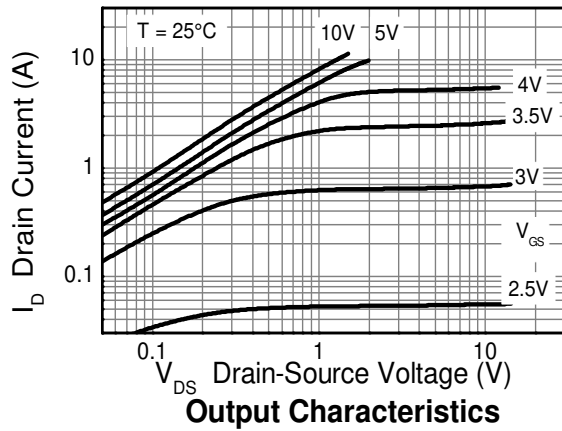


**Electrical Characteristics** (@T<sub>A</sub> = +25°C unless otherwise specified.)

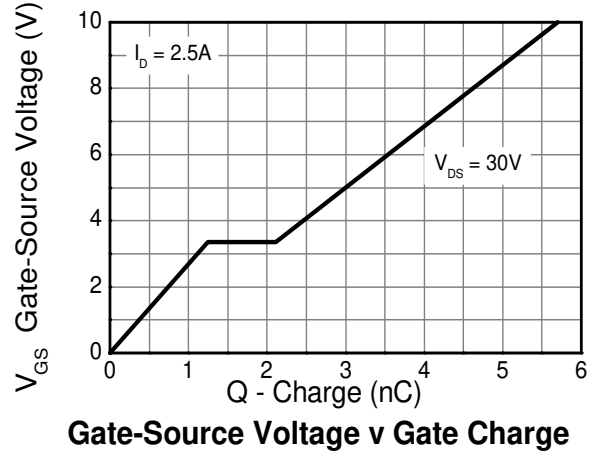
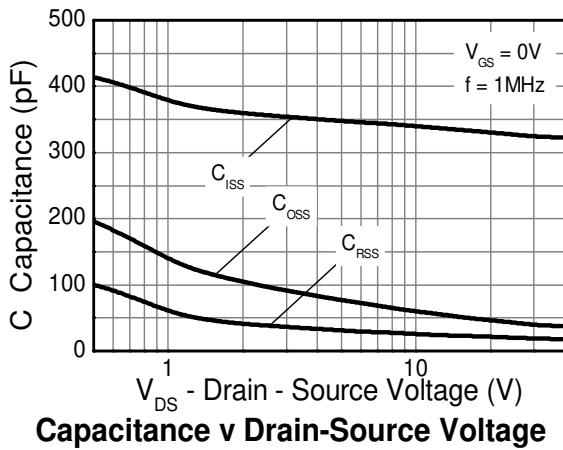
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1.0	μA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	1.0	—	3.0	V	I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 6)	R <sub>DS(on)</sub>	—	0.105	0.120	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.5A
		—	0.150	0.180		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 2A
Forward Transconductance (Notes 6 & 7)	g <sub>fs</sub>	—	4.9	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 2.5A
Diode Forward Voltage (Note 6)	V <sub>SD</sub>	—	0.85	0.95	V	I <sub>S</sub> = 2.8A, V <sub>GS</sub> = 0V, T <sub>J</sub> = +25°C
Reverse Recovery Time (Note 7)	t <sub>rr</sub>	—	21.5	—	ns	I <sub>S</sub> = 2.8A, di/dt = 100A/μs
Reverse Recovery Charge (Note 7)	Q <sub>rr</sub>	—	20.5	—	nC	T <sub>J</sub> = +25°C
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iSS</sub>	—	330	—	pF	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	35.2	—		
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	17.1	—		
Gate Charge (Note 8)	Q <sub>g</sub>	—	3.0	—	nC	V <sub>GS</sub> = 4.5V V <sub>DS</sub> = 15V I <sub>D</sub> = 2.5A
Total Gate Charge (Note 8)	Q <sub>g</sub>	—	5.7	—		
Gate-Source Charge (Note 8)	Q <sub>gs</sub>	—	1.25	—		
Gate-Drain Charge (Note 8)	Q <sub>gd</sub>	—	0.86	—	ns	V <sub>DD</sub> = 30V, I <sub>D</sub> = 2.5A, R <sub>G</sub> = 6Ω, V <sub>GS</sub> = 10V
Turn-On Delay Time (Note 8)	t <sub>D(on)</sub>	—	1.95	—		
Turn-On Rise Time (Note 8)	t <sub>r</sub>	—	3.5	—		
Turn-Off Delay Time (Note 8)	t <sub>D(off)</sub>	—	8.2	—		
Turn-Off Fall Time (Note 8)	t <sub>f</sub>	—	4.6	—		

- Notes:
- 6. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
  - 7. For design aid only, not subject to production testing.
  - 8. Switching characteristics are independent of operating junction temperature.

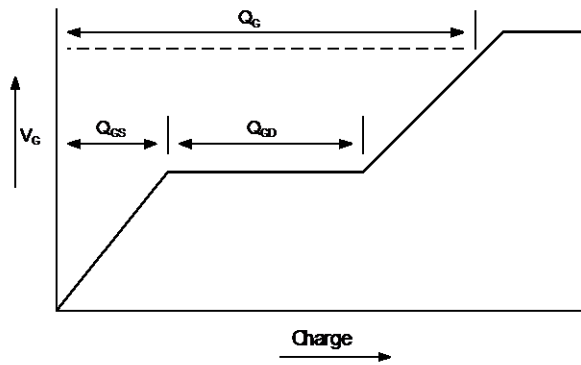
**Typical Characteristics**



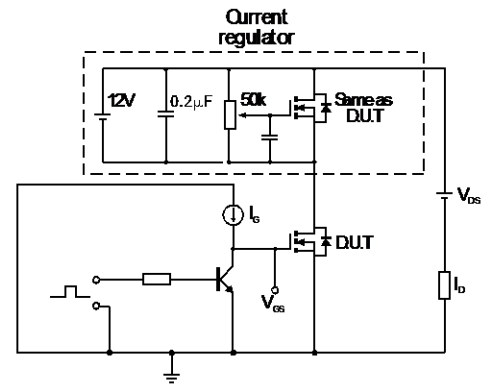
**Typical Characteristics (cont.)**



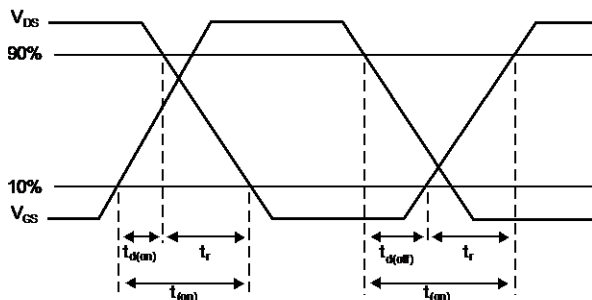
**Test Circuit**



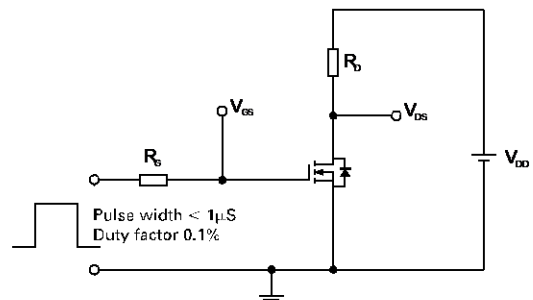
**Basic gate charge waveform**



**Gate charge test circuit**



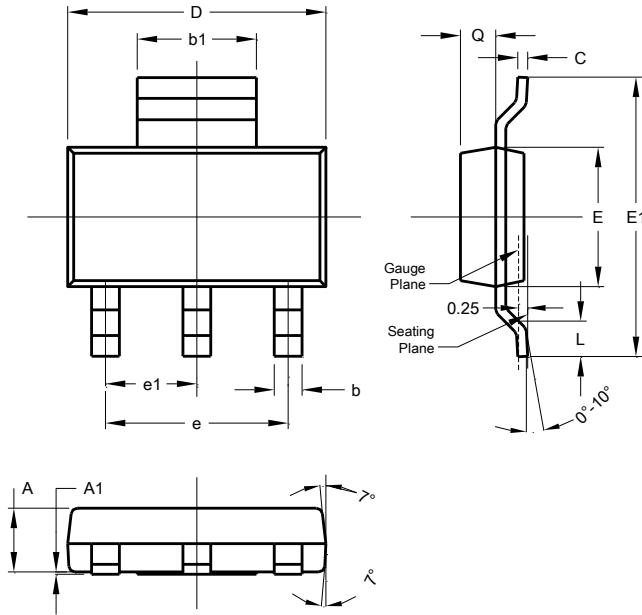
**Switching time waveforms**



**Switching time test circuit**

## Package Outline Dimensions

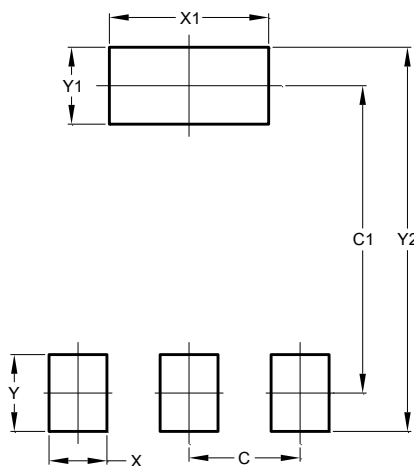
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version



SOT223			
Dim	Min	Max	Typ
A	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
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

## Suggested Pad Layout

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



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

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