

## Product Summary

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

## 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 supplies

## 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)
- For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.
- This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>

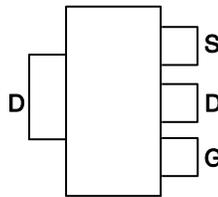
## Mechanical Data

- Package: SOT223 (Type DN)
- Package 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 (e3)
- Weight: 0.112 grams (Approximate)

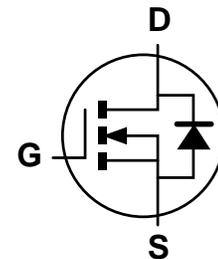
SOT223 (Type DN)



Top View



Pin Out - Top View



Equivalent Circuit

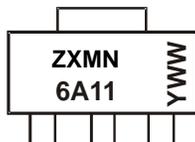
## Ordering Information (Note 4)

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) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information

SOT223 (Type DN)



ZXMN6A11 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 2= 2022)  
 WW or  $\bar{W}W$  = Week Code (01~53)

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

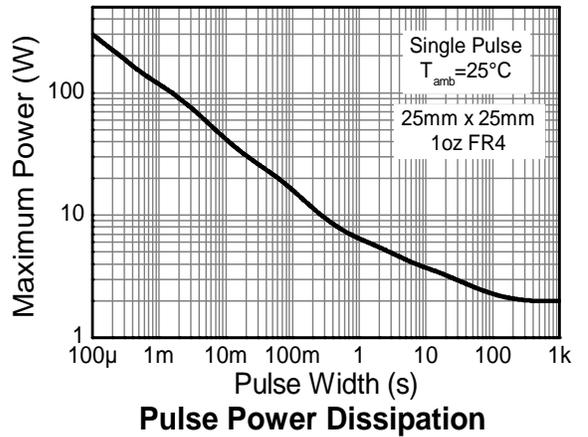
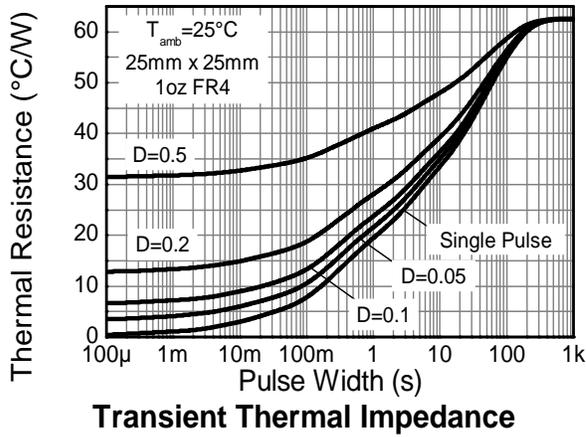
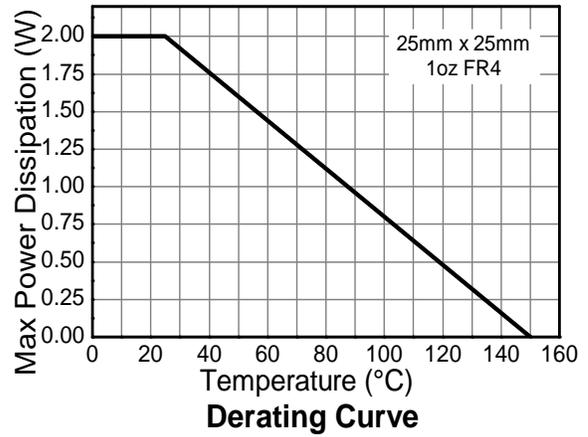
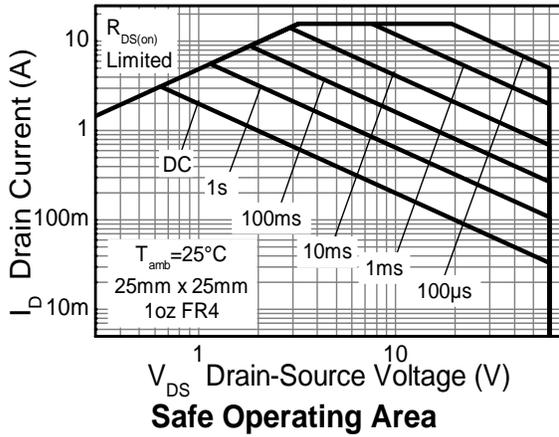
Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DS}$	60	V
Gate-Source Voltage			$V_{GS}$	$\pm 20$	
Continuous Drain Current	$V_{GS} = 10\text{V}$	(Note 6)	$I_D$	4.4	A
		$T_A = +70^\circ\text{C}$ (Note 6)		3.5	
		(Note 5)		3.1	
Pulsed Drain Current	$V_{GS} = 10\text{V}$	(Note 7)	$I_{DM}$	15.6	
Continuous Source Current (Body Diode)			(Note 6)	$I_S$	
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
	Linear Derating Factor		16	
(Note 6)			3.9	
			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	

- 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**

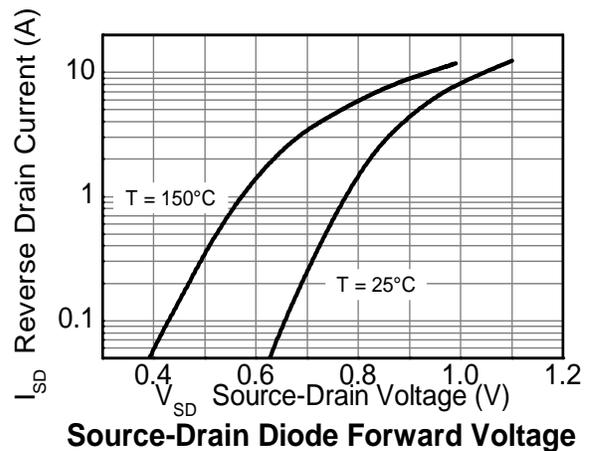
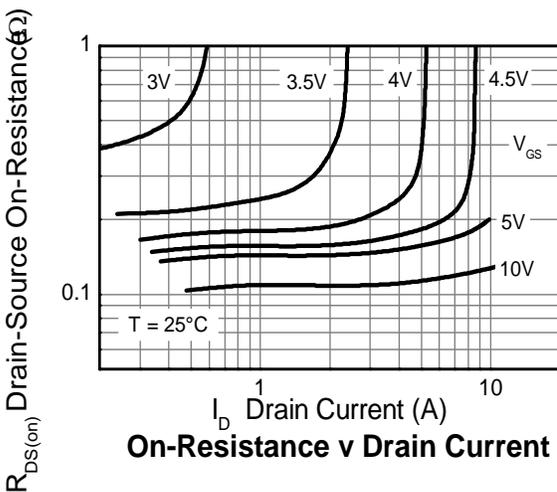
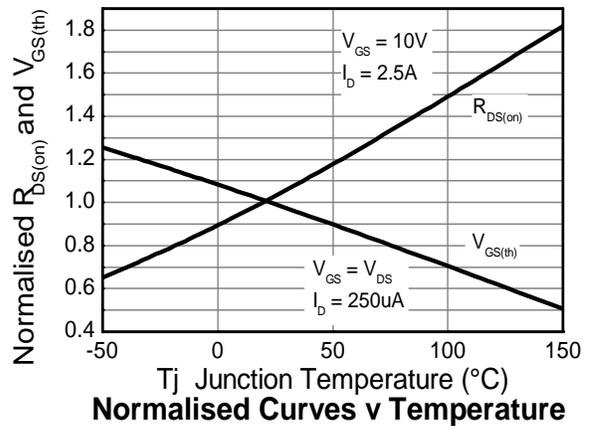
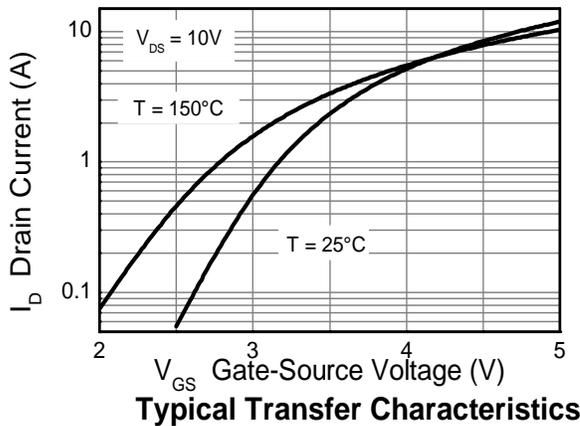
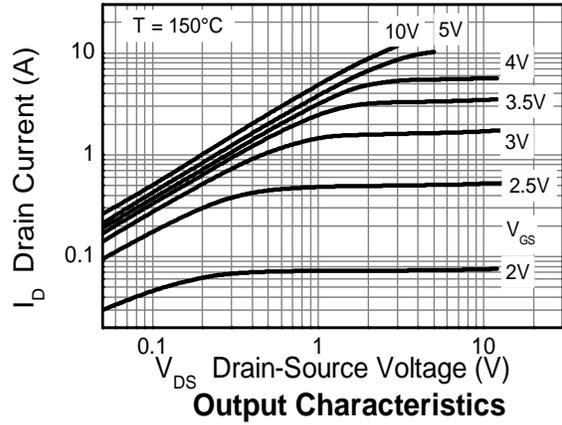
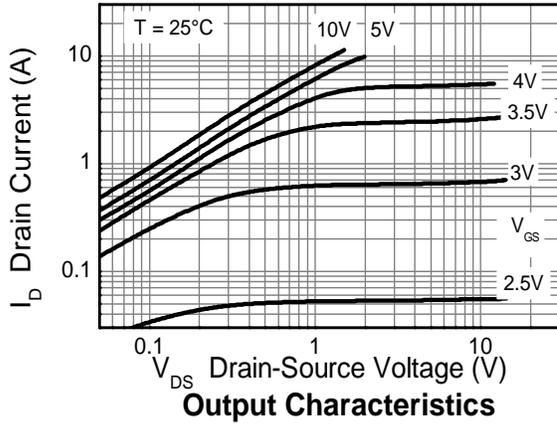


**Electrical Characteristics** (@T<sub>A</sub> = +25°C unless otherwise specified.)

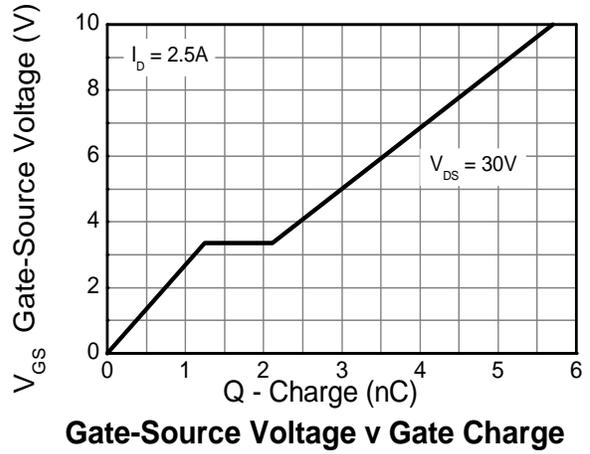
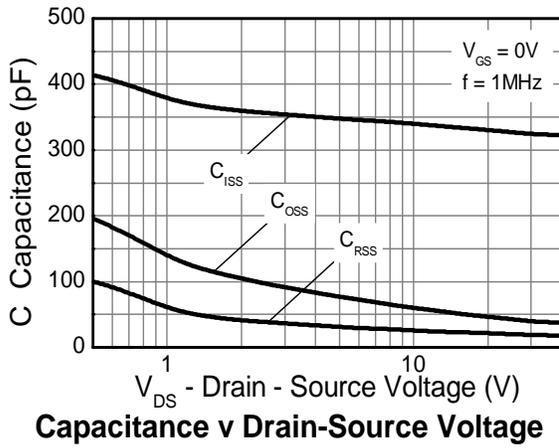
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1.0	μA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V	
Gate-Source 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	
Total Gate Charge (Note 8)	Q <sub>g</sub>	—	5.7	—		V <sub>GS</sub> = 10V	V <sub>DS</sub> = 15V I <sub>D</sub> = 2.5A
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.

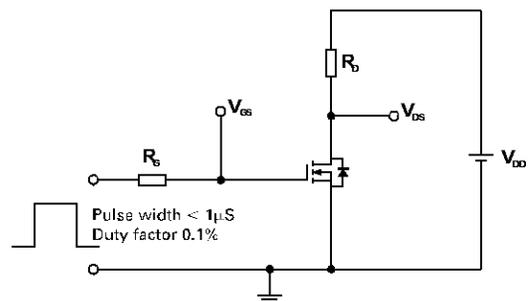
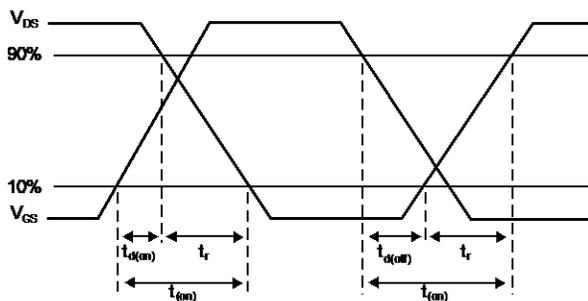
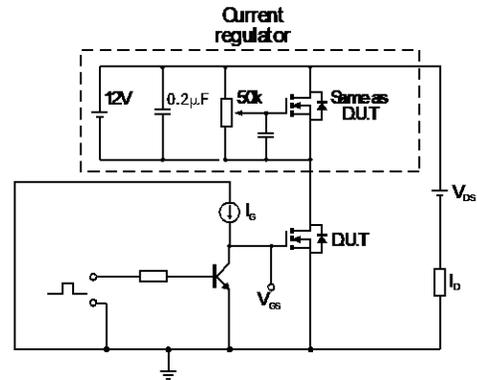
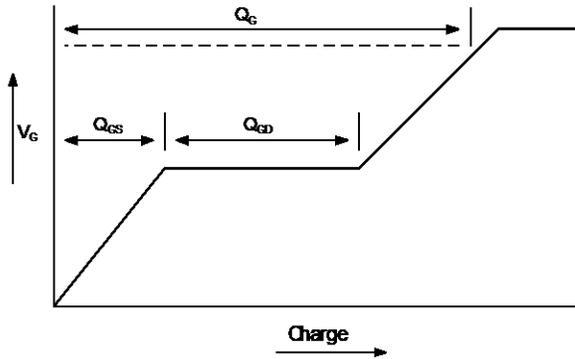
**Typical Characteristics**



**Typical Characteristics** (continued)



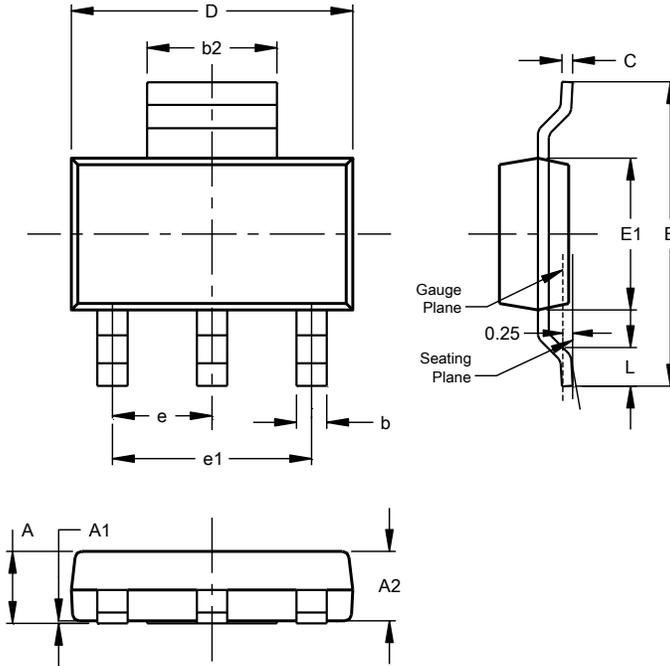
**Test Circuit**



**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT223 (Type DN)**

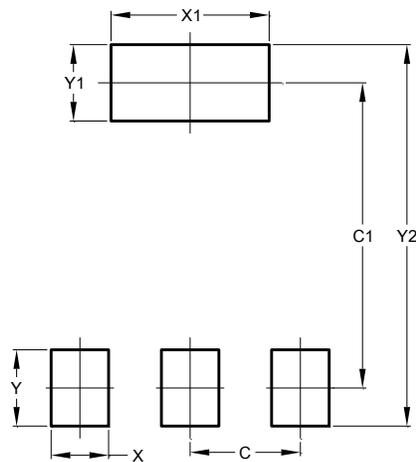


SOT223 (Type DN)			
Dim	Min	Max	Typ
A	--	1.70	--
A1	0.01	0.15	--
A2	1.50	1.68	1.60
b	0.60	0.80	0.70
b2	2.90	3.10	--
c	0.20	0.32	--
D	6.30	6.70	--
E	6.70	7.30	--
E1	3.30	3.70	--
e	--	--	2.30
e1	--	--	4.60
L	0.85	--	--
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT223 (Type DN)**



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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