

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

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/>

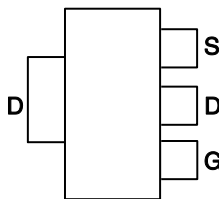
Mechanical Data

- 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)

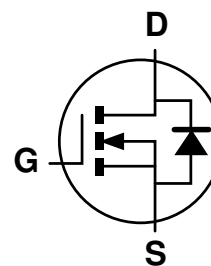
SOT223 (Type DN)



Top View



Pin Out - Top View



Equivalent Circuit

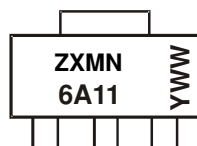
Ordering Information (Note 4)

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.)

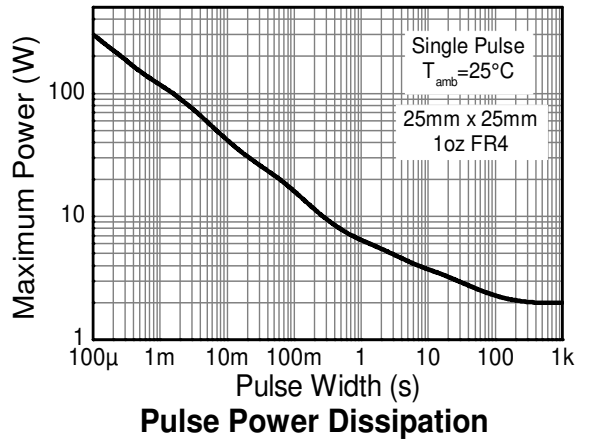
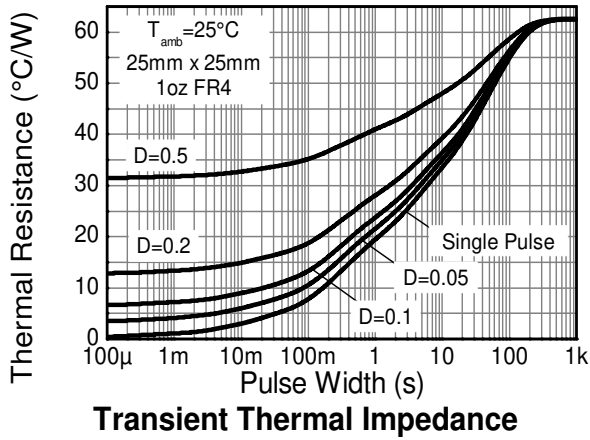
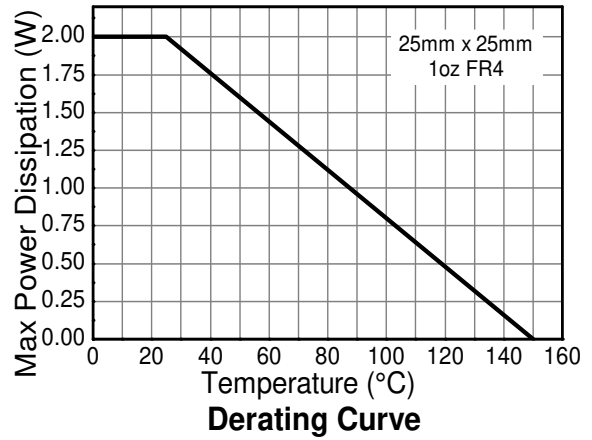
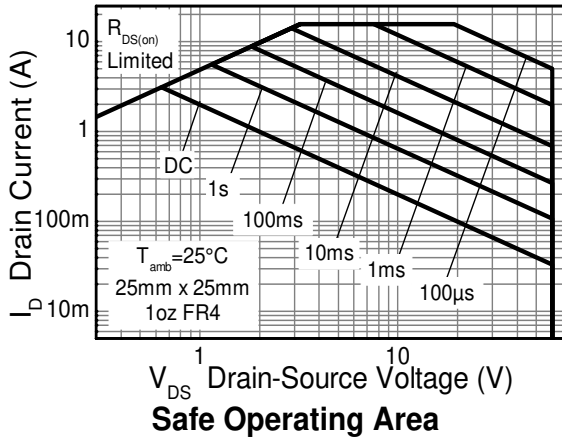
Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DS}	60	V
Gate-Source Voltage			V_{GS}	± 20	
Continuous Drain Current	$V_{GS} = 10\text{V}$	(Note 6)	I_D	4.4	A
		$T_A = +70^\circ\text{C}$ (Note 6)		3.5	
		(Note 5)		3.1	
Pulsed Drain Current	$V_{GS} = 10\text{V}$	(Note 7)	I_{DM}	15.6	
Continuous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

- 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 μs .
 8. Thermal resistance from junction to solder-point (at the end of the drain lead).

Thermal Characteristics

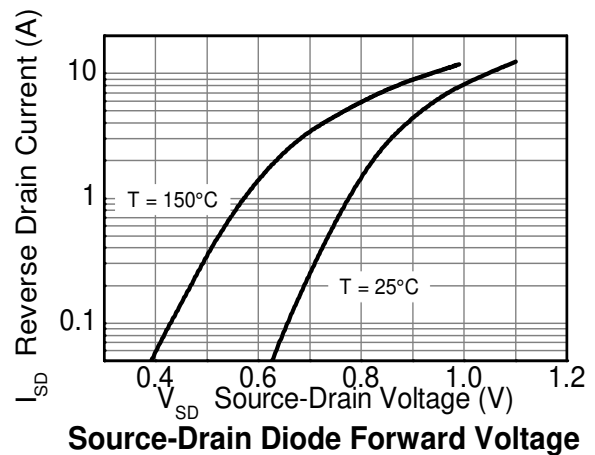
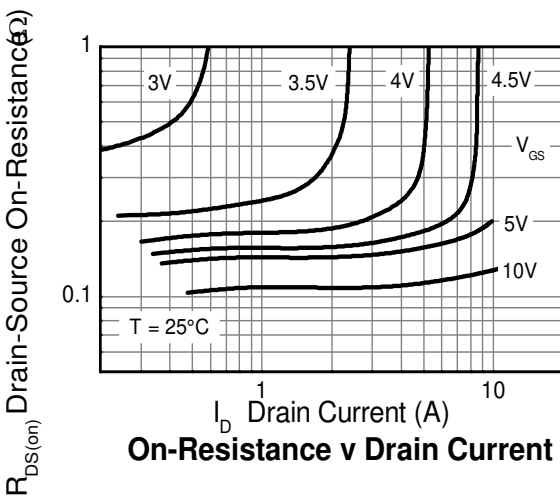
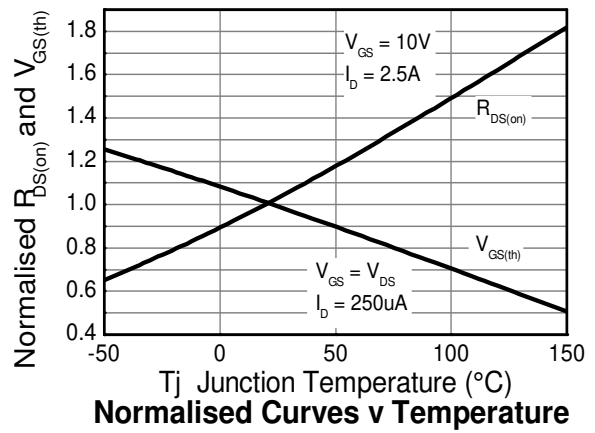
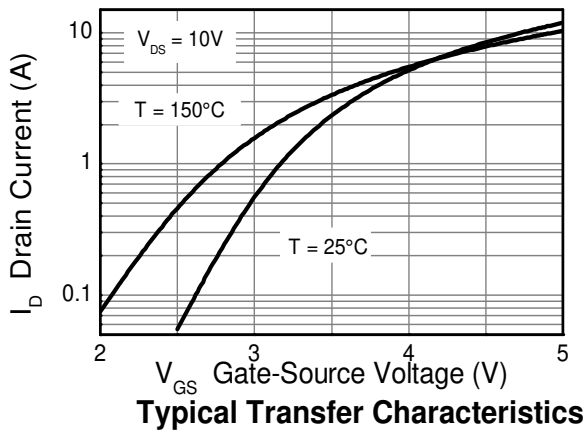
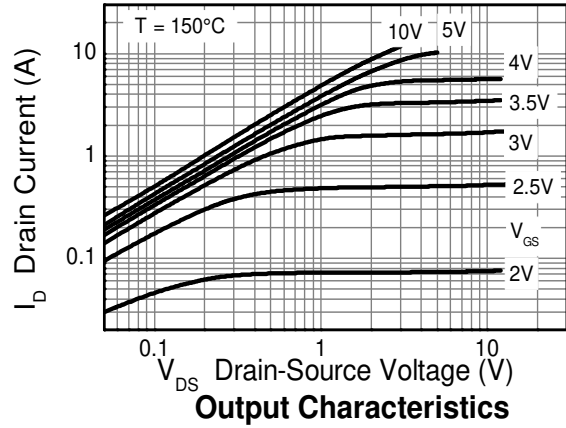
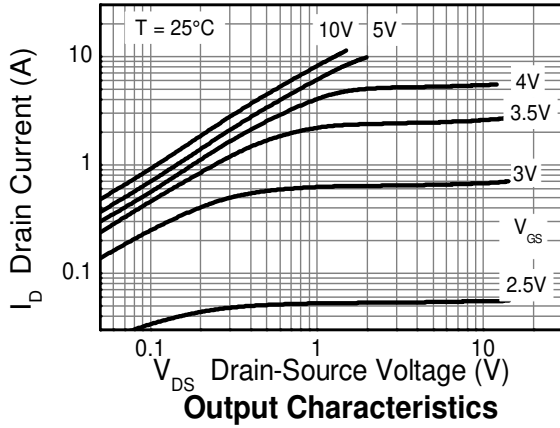


Electrical Characteristics (@T_A = +25°C unless otherwise specified.)

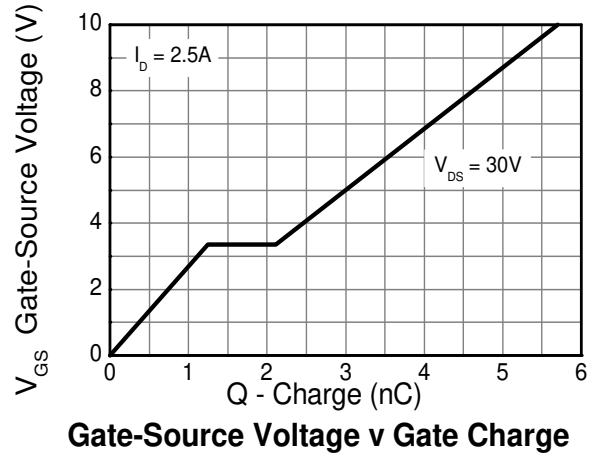
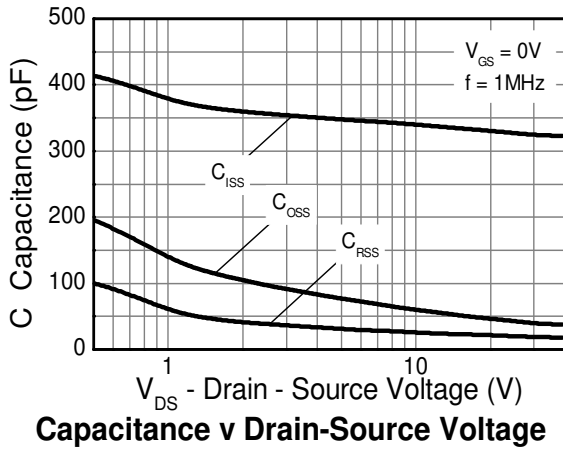
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	I _D = 250μA, V _{GS} = 0V
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1.0	μA	V _{DS} = 60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS}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

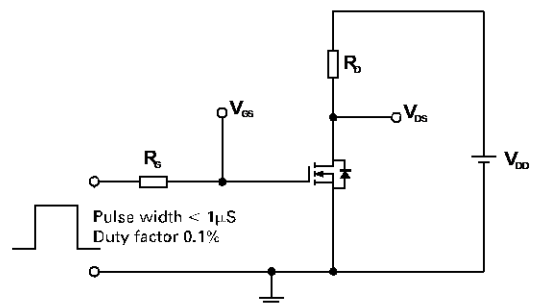
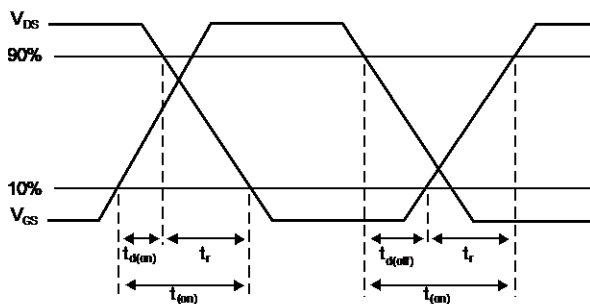
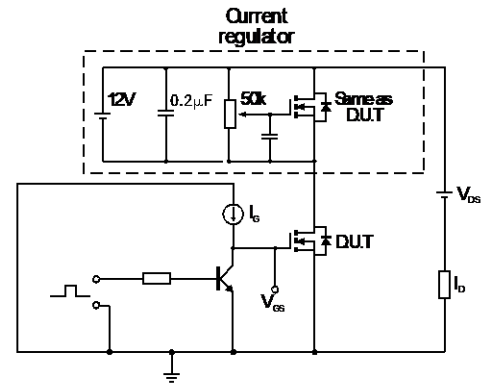
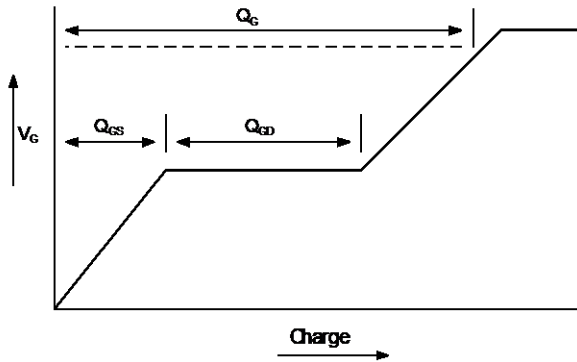
Typical Characteristics



Typical Characteristics (continued)



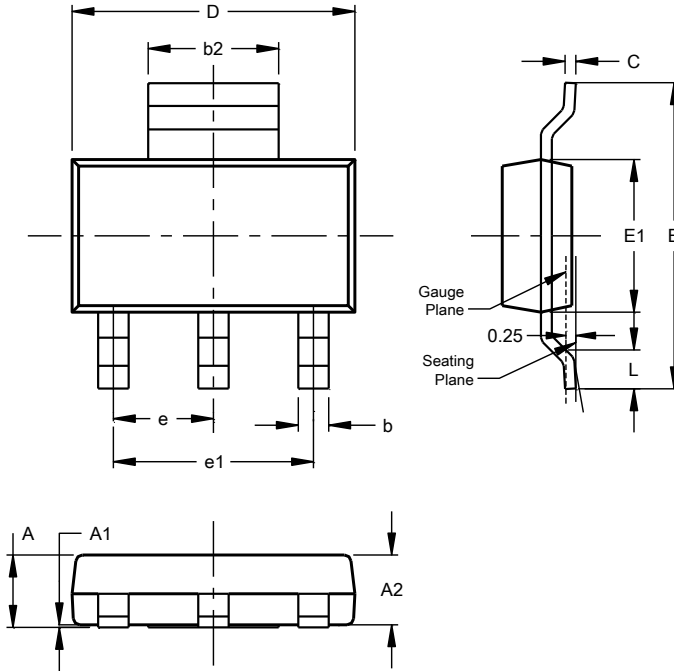
Test Circuit



Package Outline Dimensions

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

SOT223 (Type DN)

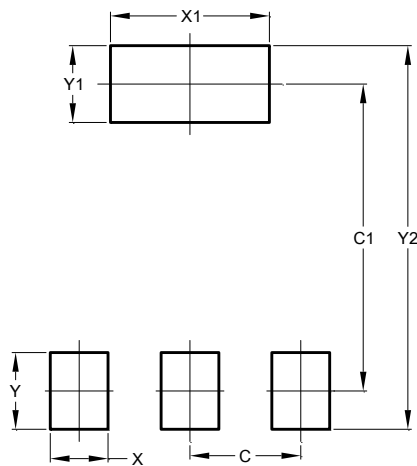


SOT223 (Type DN)			
Dim	Min	Max	Typ
A	--	1.70	--
A1	0.01	0.15	--
A2	1.50	1.68	1.60
b	0.60	0.80	0.70
b2	2.90	3.10	--
c	0.20	0.32	--
D	6.30	6.70	--
E	6.70	7.30	--
E1	3.30	3.70	--
e	--	--	2.30
e1	--	--	4.60
L	0.85	--	--
All Dimensions in mm			

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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