

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D $T_A = +25^{\circ}C$
40V	0.05Ω @ $V_{GS} = 10V$	7A

Description

This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- DC-DC Converters
- Audio Output Stages
- Relay and Solenoid driving
- Motor Control

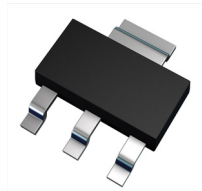
Features

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

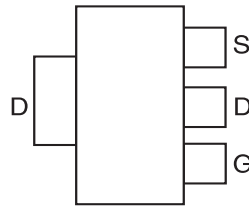
Mechanical Data

- Case: SOT223
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208 **e3**
- Weight: 0.112 grams (approximate)

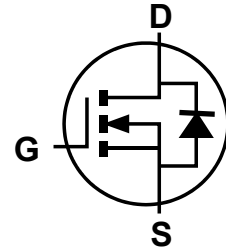
SOT223



Top View



Pin Out - Top View



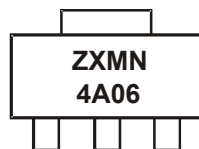
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
ZXMN4A06GTA	Standard	SOT223	1,000/Tape & Reel

- Note:
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



ZXMN = Product Type Marking Code, Line 1
4A06 = Product Type Marking Code, Line 2

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

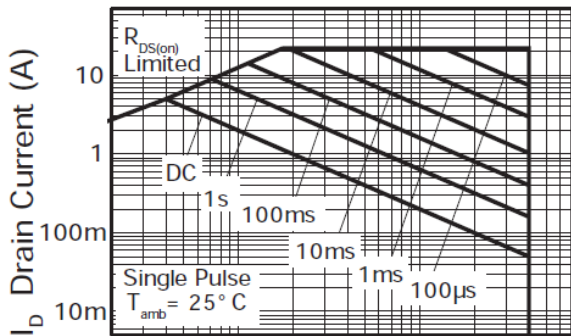
Characteristic			Symbol	Value	Unit	
Drain-Source Voltage			V_{DS}	40	V	
Gate-Source Voltage			V_{GS}	± 20	V	
Continuous Drain Current	$V_{GS} = 10\text{V}$	(Note 6)	I_D	7	A	
		$T_A = +70^\circ\text{C}$ (Note 6)		5.6		
		(Note 5)		5		
Pulsed Drain Current	$V_{GS} = 10\text{V}$	(Note 7)	I_{DM}	22	A	
Continuous Source Current (Body diode)			(Note 6)	I_S	5.4	A
Pulsed Source Current (Body diode)			(Note 7)	I_{SM}	22	A

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

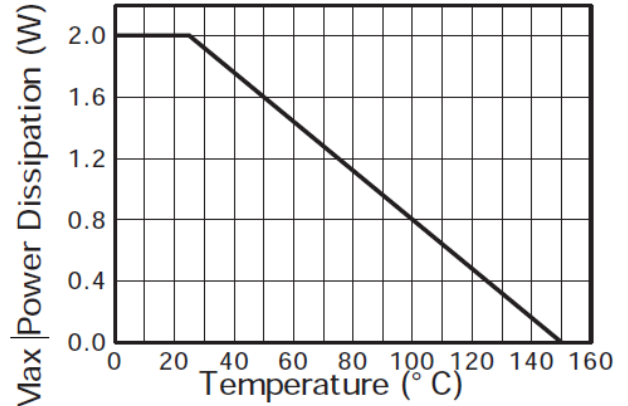
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	2	W
			16	
Linear Derating Factor	(Note 6)		3.9	$\text{mW}/^\circ\text{C}$
			31	
Thermal Resistance, Junction to Ambient	(Note 7)	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$
	(Note 6)		32.2	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Notes: 5. For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
 6. For a device surface mounted on FR-4 PCB measured at $t \leq 5$ secs.
 7. Repetitive rating 25mm x 25mm FR4 PCB, $D = 0.05$, pulse width 10 μs - pulse width limited by maximum junction temperature.

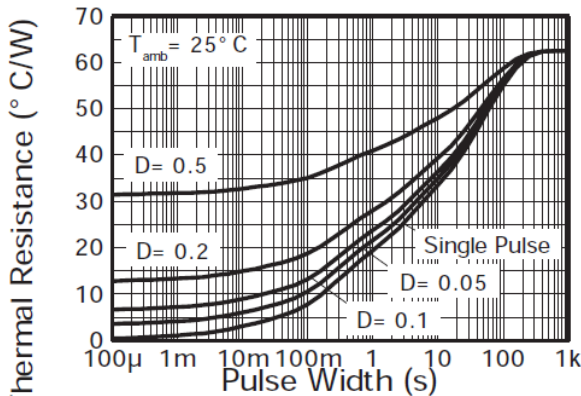
Thermal Characteristics



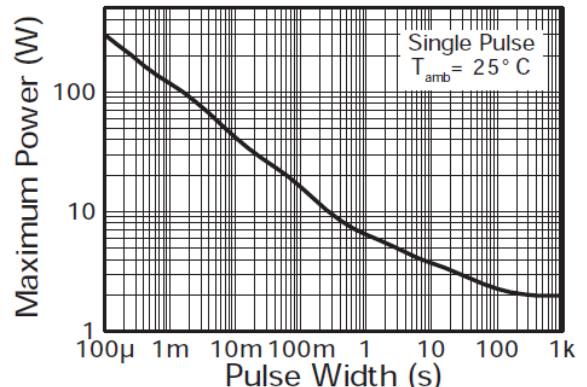
Safe Operating Area



Derating Curve



Transient Thermal Impedance



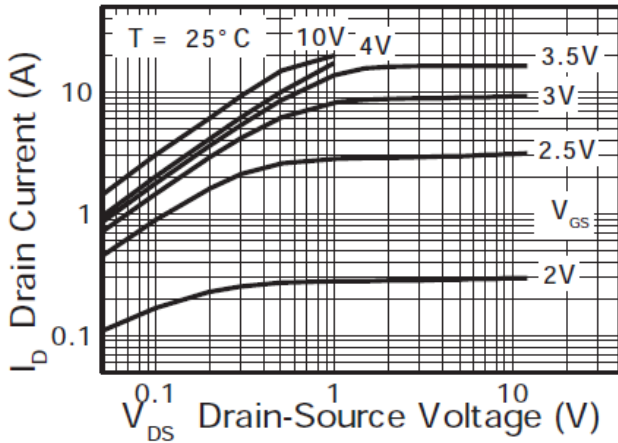
Pulse Power Dissipation

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

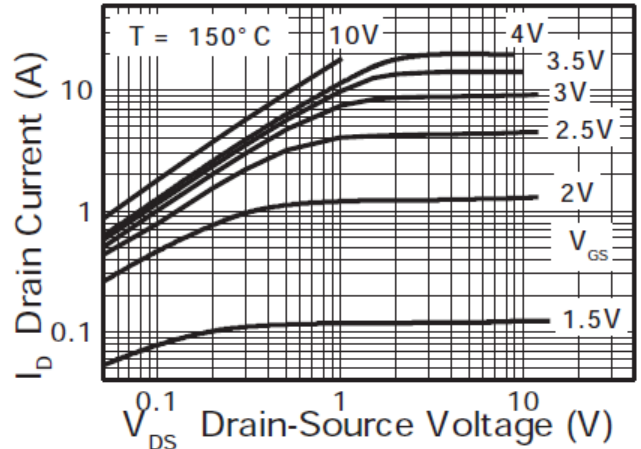
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	40	—	—	V	I _D = 250μA, V _{GS} = 0V
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 40V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(th)}	1	—	2	V	I _D = 250μA, V _{DS} = V _{GS}
Static Drain-Source On-Resistance (Note 9)	R _{DS(on)}	—	—	0.05	Ω	V _{GS} = 10V, I _D = 4.5A
				0.075		V _{GS} = 4.5V, I _D = 3.2A
Forward Transconductance (Notes 11)	g _{fs}	—	8.7	—	S	V _{DS} = 15V, I _D = 2.5A
Diode Forward Voltage (Note 9)	V _{SD}	—	0.8	0.95	V	I _S = 2.5A, V _{GS} = 0V, T _J = +25°C
Reverse recovery time (Note 11)	t _{rr}	—	19.86	—	ns	I _F = 2.5A, di/dt = 100A/μs,
Reverse recovery charge (Note 11)	Q _{rr}	—	16.36	—	nC	T _J = +25°C
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	770	—	pF	V _{DS} = 40V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	92	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	61	—	pF	
Total Gate Charge (Note 11)	Q _g	—	18.2	—	nC	V _{DS} = 30V, V _{GS} = 10V, I _D = 2.5A (refer to test circuit)
Gate-Source Charge (Note 11)	Q _{gs}	—	2.1	—	nC	
Gate-Drain Charge (Note 11)	Q _{gd}	—	4.5	—	nC	
Turn-On Delay Time (Note 11)	t _{D(on)}	—	2.55	—	ns	V _{DD} = 30V, V _{GS} = 10V I _D = 2.5A, R _G = 6Ω (refer to test circuit)
Turn-On Rise Time (Note 11)	t _r	—	4.45	—	ns	
Turn-Off Delay Time (Note 11)	t _{D(off)}	—	28.61	—	ns	
Turn-Off Fall Time (Note 11)	t _f	—	7.35	—	ns	

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

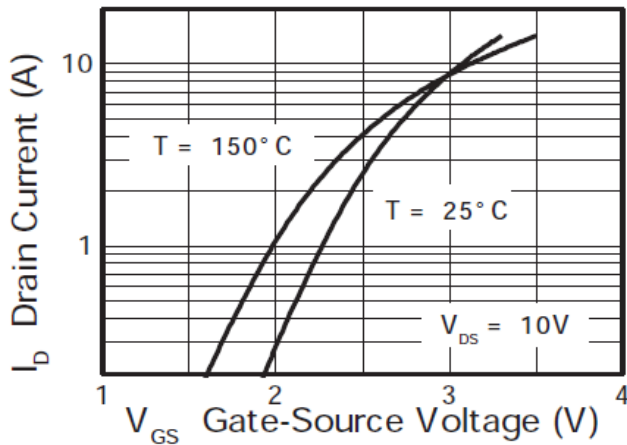
Typical Characteristics



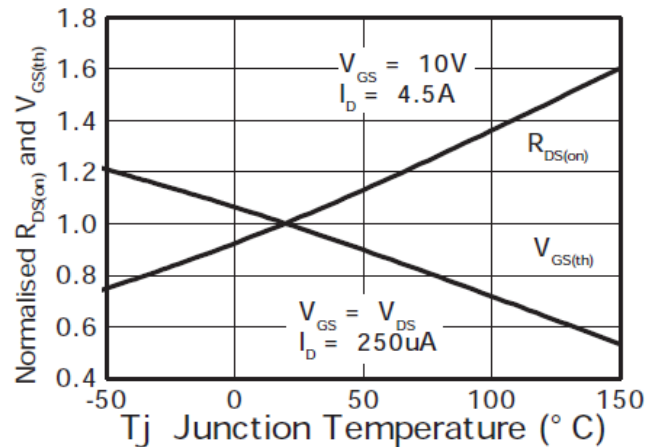
Output Characteristics



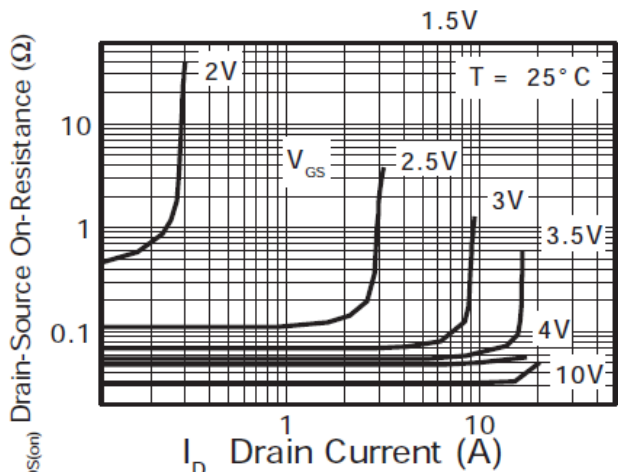
Output Characteristics



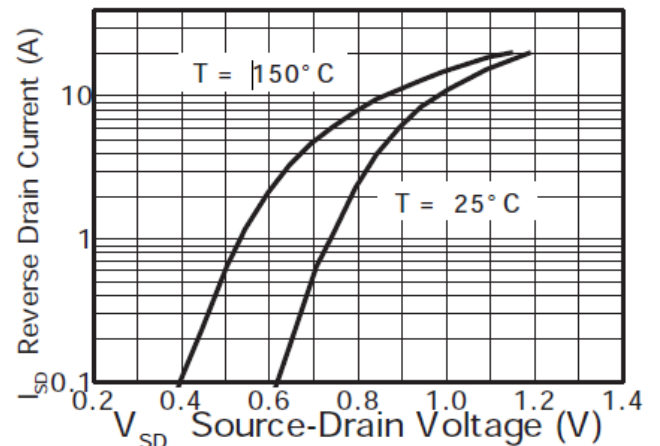
Typical Transfer Characteristics



Normalised Curves v Temperature

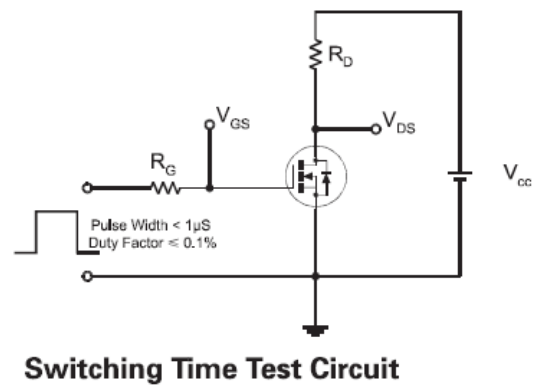
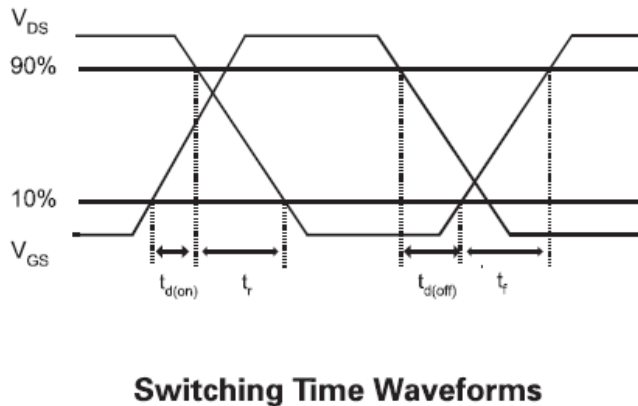
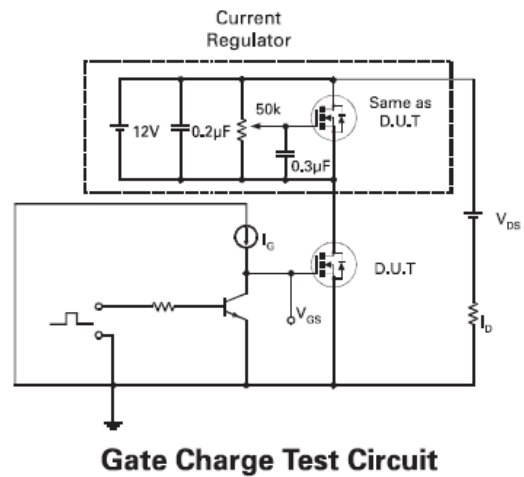
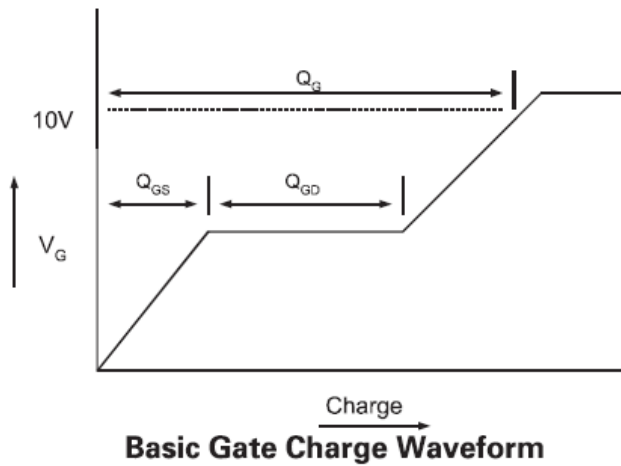
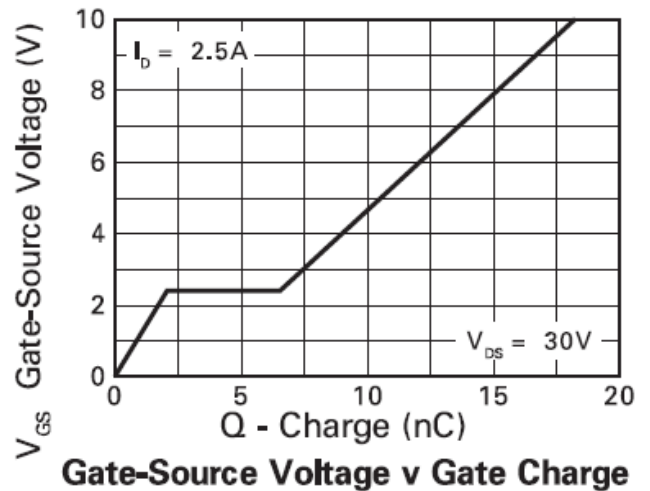
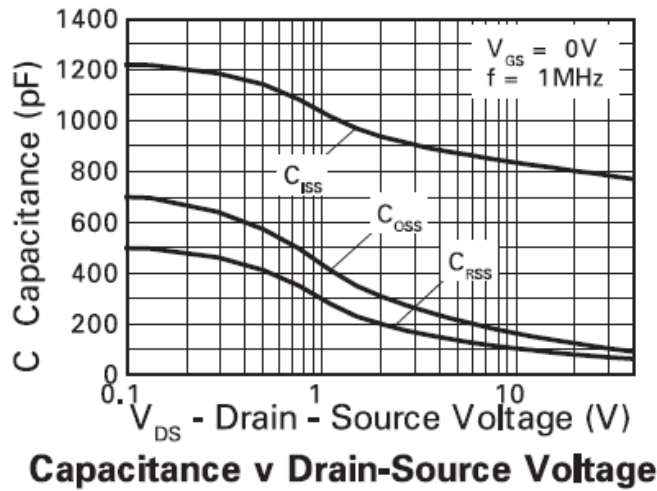


On-Resistance v Drain Current



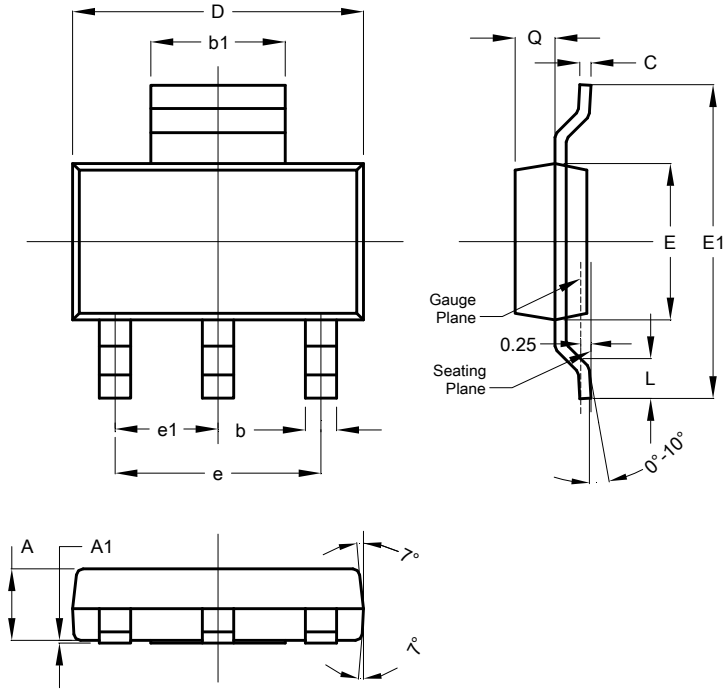
Source-Drain Diode Forward Voltage

Typical Characteristics – (cont.)



Package Outline Dimensions

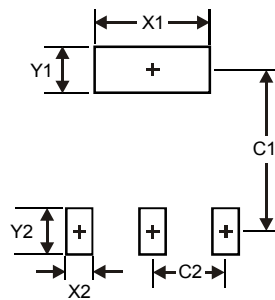
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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



Dimensions	Value (in mm)
X1	3.3
X2	1.2
Y1	1.6
Y2	1.6
C1	6.4
C2	2.3

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