

Product Summary

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

Description

This new generation MOSFET is 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**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([ZXMN4A06GQ](#))**

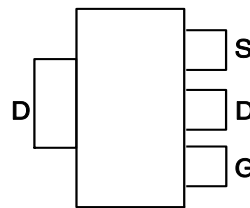
Mechanical Data

- 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 Leadframe; Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.112 grams (Approximate)

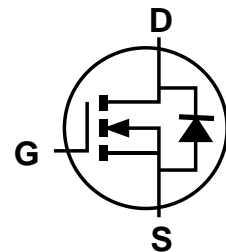
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

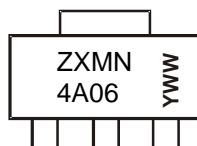
Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
ZXMN4A06GTA	Standard	SOT223	1,000/Tape & Reel
ZXMN4A06GTC	Standard	SOT223	4,000/Tape & Reel

- 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

SOT223



ZXMN4A06 = Product Type Marking Code
 YWW = Date Code Marking
 Y or \bar{Y} = Last Digit of Year (ex: 6 = 2016)
 WW or $\bar{W}W$ = Week Code (01 to 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

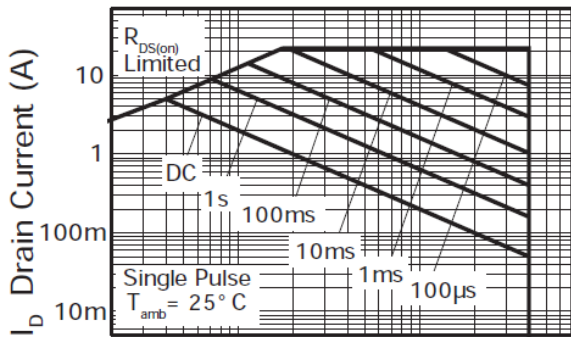
Characteristic			Symbol	Value	Unit	
Drain-Source Voltage			V _{DSS}	40	V	
Gate-Source Voltage			V _{GS}	±20	V	
Continuous Drain Current	V _{GS} = 10V	(Note 6)	I _D	7	A	
		T _A = +70°C (Note 6)		5.6		
		(Note 5)		5		
Pulsed Drain Current	V _{GS} = 10V	(Note 7)	I _{DM}	22	A	
Continuous Source Current (Body Diode)			(Note 6)	I _S	5.4	A
Pulsed Source Current (Body Diode)			(Note 7)	I _{SM}	22	A

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

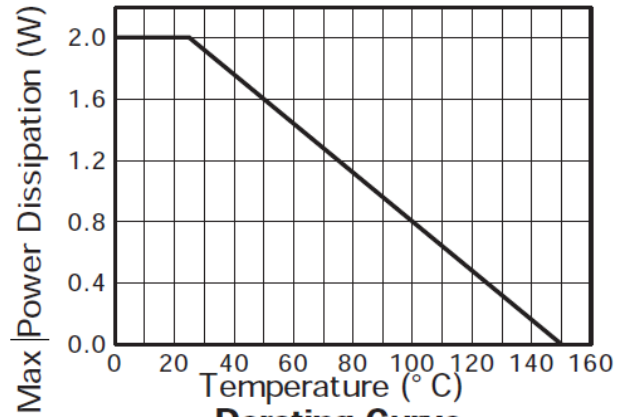
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P _D	2	W
			16	
	Linear Derating Factor		3.9	
Thermal Resistance, Junction to Ambient	(Note 7)	R _{θJA}	62.5	°C/W
	(Note 6)		32.2	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- 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 ≤ 5 seconds.
 - 7. Repetitive rating 25mm x 25mm FR-4 PCB, D = 0.05, pulse width 10µs - pulse width limited by maximum junction temperature.

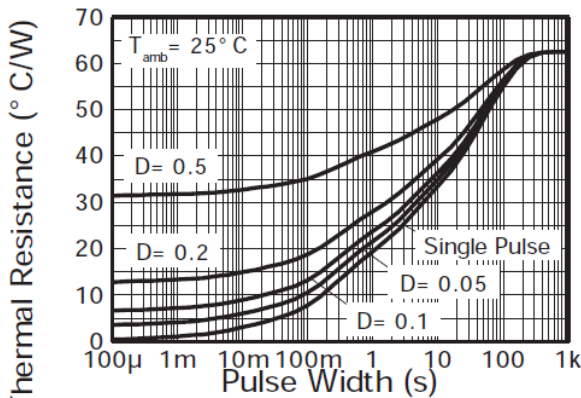
Thermal Characteristics



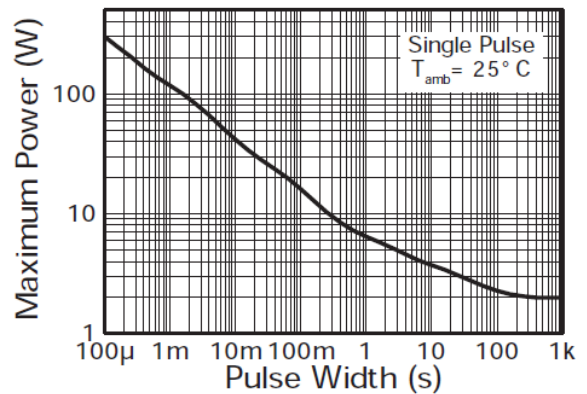
Safe Operating Area



Derating Curve



Transient Thermal Impedance



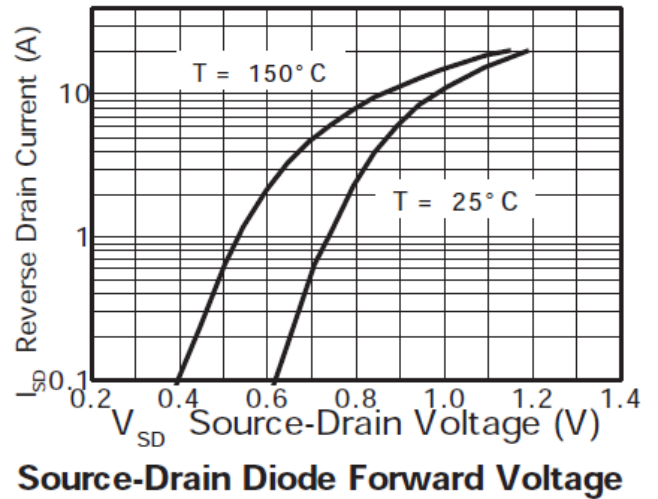
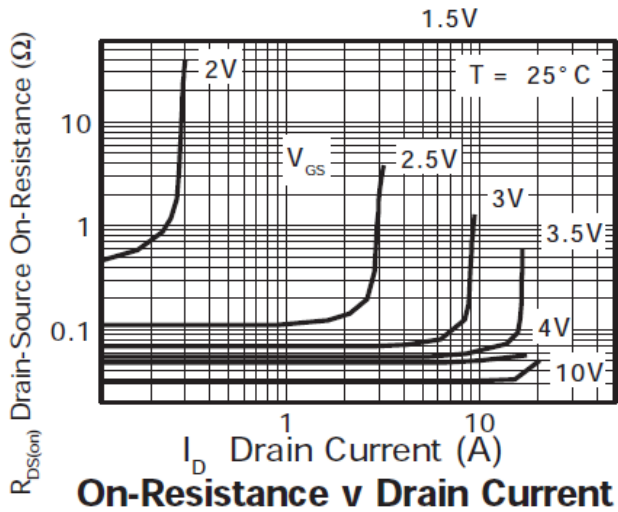
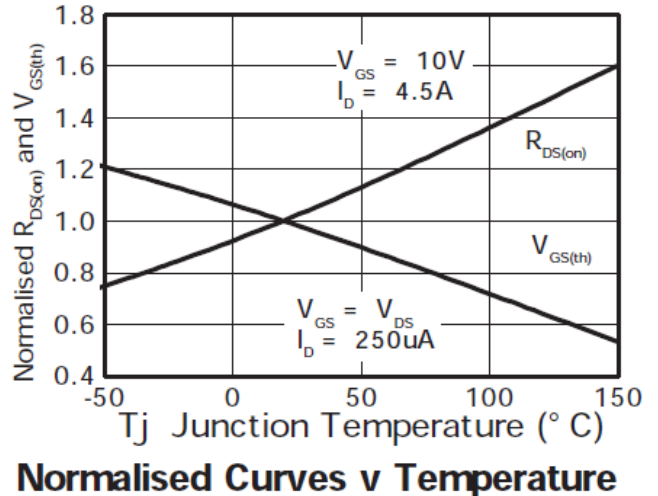
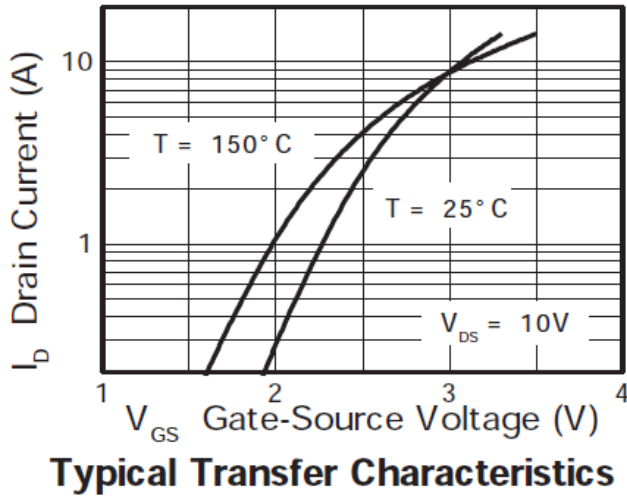
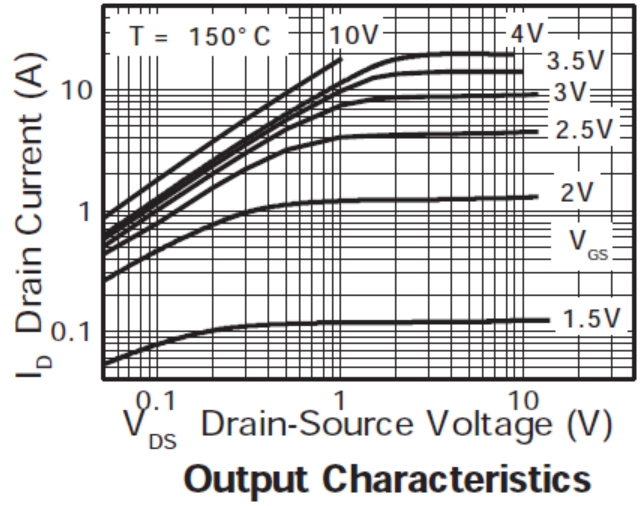
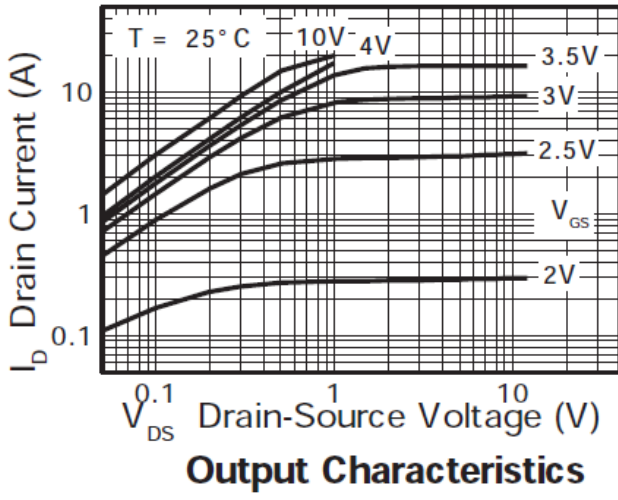
Pulse Power Dissipation

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

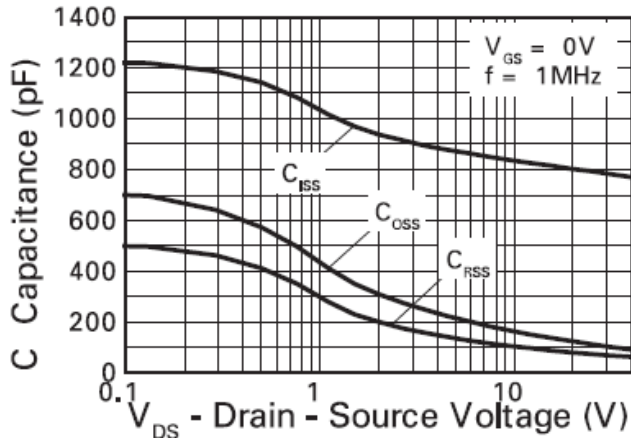
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV _{DSS}	40	—	—	V	I _D = 250μA, V _{GS} = 0V
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 40V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, 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 8)	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	g _{fs}	—	8.7	—	S	V _{DS} = 15V, I _D = 2.5A
Diode Forward Voltage (Note 8)	V _{SD}	—	0.8	0.95	V	I _F = 2.5A, V _{GS} = 0V, T _J = +25°C
Reverse Recovery Time (Note 9)	t _{RR}	—	19.86	—	ns	I _F = 2.5A, di/dt = 100A/μs,
Reverse Recovery Charge (Note 9)	Q _{RR}	—	16.36	—	nC	T _J = +25°C
DYNAMIC CHARACTERISTICS (Note 9)						
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	Q _g	—	18.2	—	nC	V _{DS} = 30V, V _{GS} = 10V, I _D = 2.5A (Refer to test circuit)
Gate-Source Charge	Q _{gs}	—	2.1	—	nC	
Gate-Drain Charge	Q _{gd}	—	4.5	—	nC	
Turn-On Delay Time	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	t _r	—	4.45	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	28.61	—	ns	
Turn-Off Fall Time	t _f	—	7.35	—	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

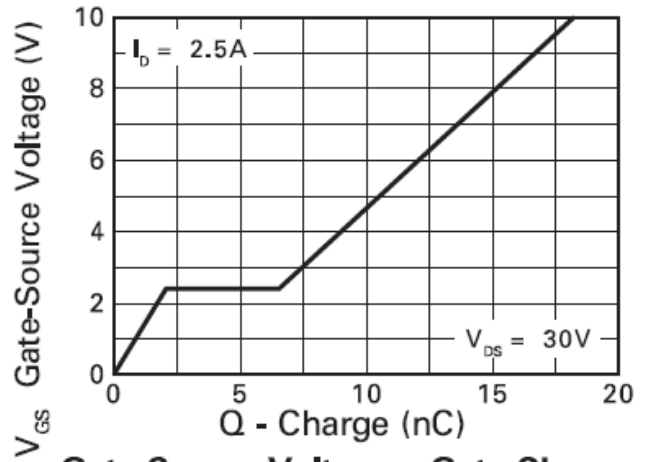
Typical Characteristics



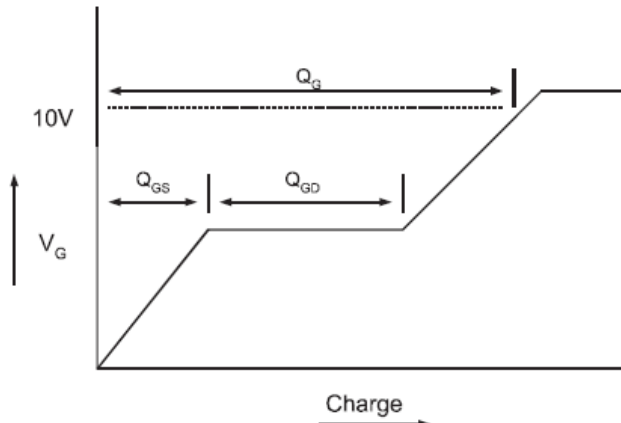
Typical Characteristics (Cont.)



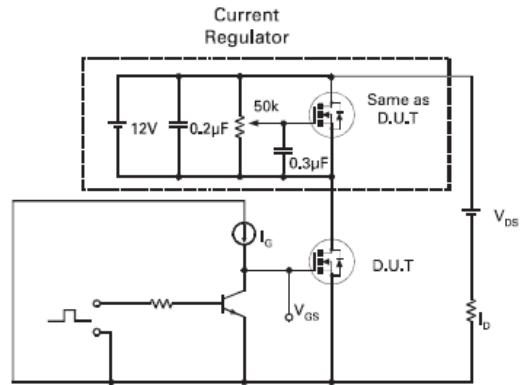
Capacitance v Drain-Source Voltage



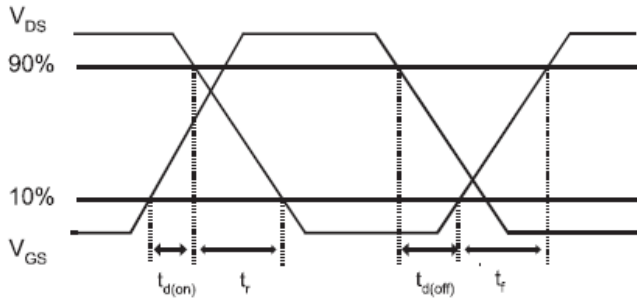
Gate-Source Voltage v Gate Charge



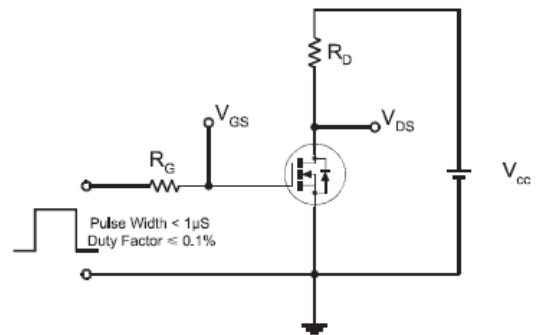
Basic Gate Charge Waveform



Gate Charge Test Circuit



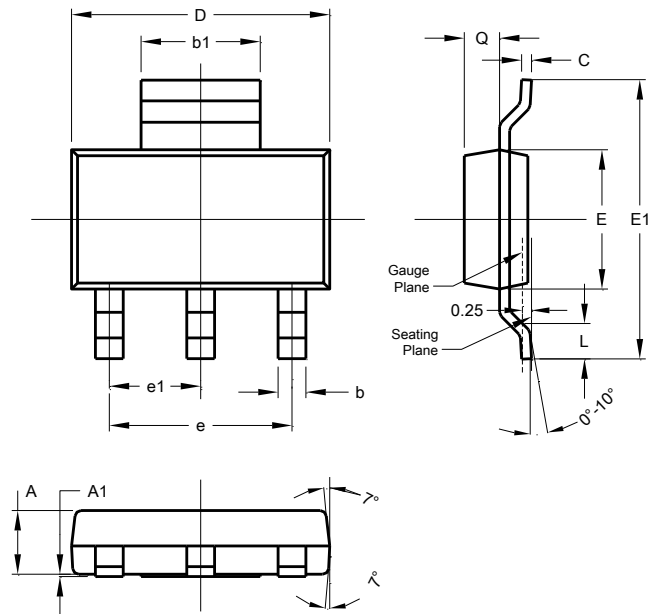
Switching Time Waveforms



Switching Time Test Circuit

Package Outline Dimensions

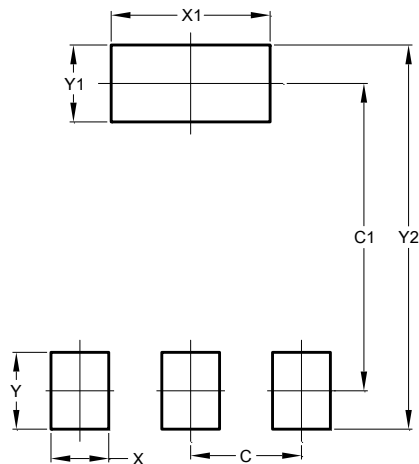
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



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 <http://www.diodes.com/package-outlines.html> 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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