

**ZXMP3A16G**

**30V P-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(on) max}$	$I_D max$ $T_A = +25^\circ C$ (Note 6)
-30V	45m $\Omega$ @ $V_{GS} = -10V$	-7.5A
	70m $\Omega$ @ $V_{GS} = -4.5V$	-5.9A

**Features and Benefits**

- 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**

**Description and Applications**

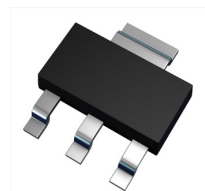
This MOSFET is designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- Motor Control
- DC-DC Converters
- Power Management Functions
- Relay and Solenoid Driving

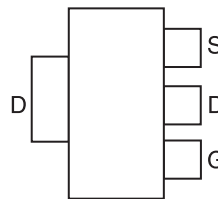
**Mechanical Data**

- 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)

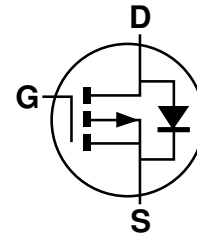
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

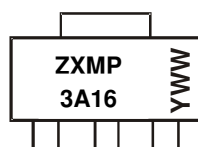
**Ordering Information** (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMP3A16GTA	ZXMP3A16	7	12	1,000
ZXMP3A16GTC	ZXMP3A16	13	12	4,000

- 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. Diodes, Inc. defines "Green" products as those which are RoHS compliant and contain no halogens or antimony compounds. All applicable RoHS exemptions applied. Further information about Diodes Inc.'s "Green" Policy can be found on our website.

**Marking Information**

SOT223



ZXMP3A16 = 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.)

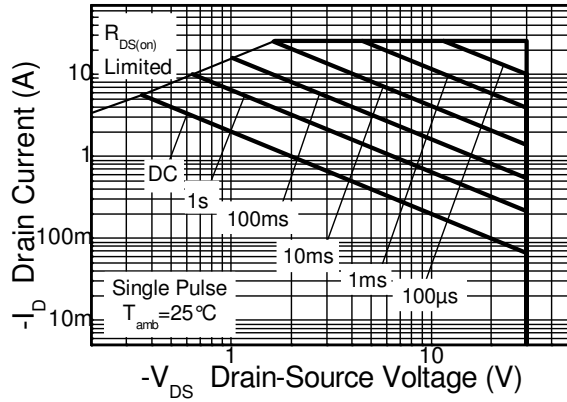
Characteristic		Symbol	Value	Unit	
Drain-Source Voltage		$V_{DSS}$	-30	V	
Gate-Source Voltage		$V_{GS}$	$\pm 20$	V	
Continuous Drain Current	$V_{GS} = 10\text{V}$	$I_D$	(Note 6)	-7.5	A
			$T_A = +70^\circ\text{C}$ (Note 6)	-6.0	
			(Note 5)	-5.4	
Pulsed Drain Current	$V_{GS} = 10\text{V}$	$I_{DM}$	-24.9	A	
Continuous Source Current (Body diode)		$I_S$	-3.2	A	
Pulsed Source Current (Body diode)		$I_{SM}$	-24.9	A	

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

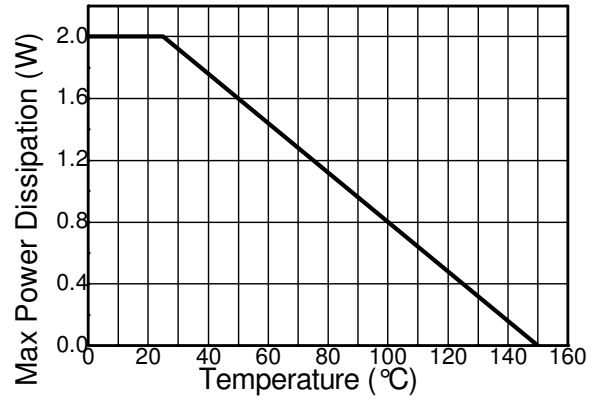
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	$P_D$	2.0	W
	Linear Derating Factor		16	
Linear Derating Factor	(Note 6)		3.9	mW/ $^\circ\text{C}$
			31	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$
	(Note 6)		32.2	
Thermal Resistance, Junction to Lead	(Note 8)	$R_{\theta JL}$	8.51	$^\circ\text{C}/\text{W}$
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  $t \leq 10$  sec.
  7. Same as Note (5), except the device is pulsed with  $D = 0.02$  and pulse width 300  $\mu\text{s}$ . The pulse current is limited by the maximum junction temperature.
  8. Thermal resistance from junction to solder-point (at the end of the drain lead).

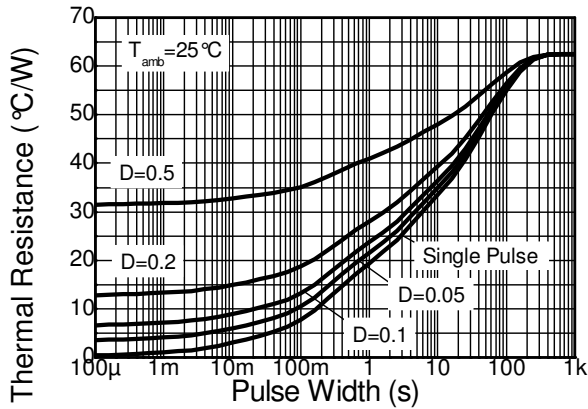
**Thermal Characteristics**



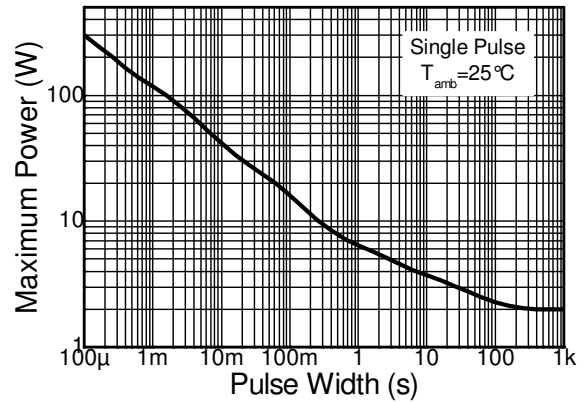
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



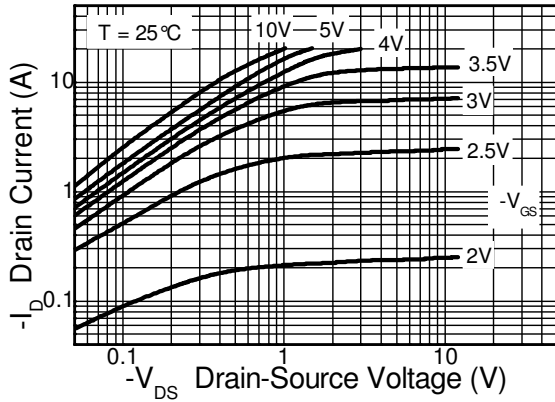
**Pulse Power Dissipation**

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

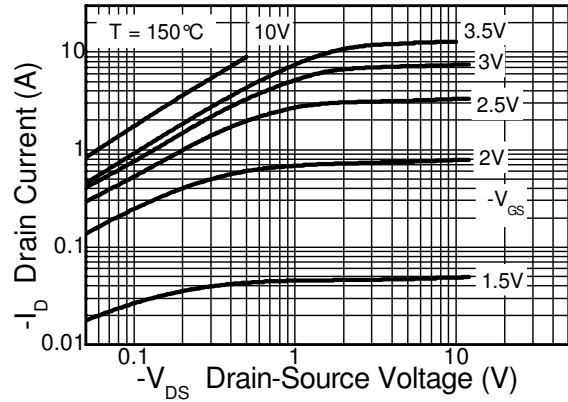
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-30	—	—	V	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-1	μA	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V
Gate-Source 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	—	—	V	I <sub>D</sub> = -250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 9)	R <sub>DS(on)</sub>	—	—	45	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -4.2A
				70		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.4A
Forward Transconductance (Notes 9 & 10)	g <sub>fs</sub>	—	9.2	—	S	V <sub>DS</sub> = -15V, I <sub>D</sub> = -4.2A
Diode Forward Voltage (Note 9)	V <sub>SD</sub>	—	-0.85	-0.95	V	I <sub>S</sub> = -3.6A, V <sub>GS</sub> = 0V, T <sub>J</sub> = +25°C
Reverse Recovery Time (Note 10)	t <sub>rr</sub>	—	21.7	—	ns	I <sub>F</sub> = -2A, di/dt = 100A/μs,
Reverse Rsecovery Charge (Note 10)	Q <sub>rr</sub>	—	16.1	—	nC	T <sub>J</sub> = +25°C
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	C <sub>iSS</sub>	—	1,022	—	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	267	—	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	229	—	pF	
Total Gate Charge (Note 11)	Q <sub>g</sub>	—	17.2	—	nC	V <sub>GS</sub> = -5V
Total Gate Charge (Note 11)	Q <sub>g</sub>	—	29.6	—	nC	V <sub>GS</sub> = -10V V <sub>DS</sub> = -15V I <sub>D</sub> = -4.2A
Gate-Source Charge (Note 11)	Q <sub>gs</sub>	—	2.8	—	nC	
Gate-Drain Charge (Note 11)	Q <sub>gd</sub>	—	8.6	—	nC	
Turn-On Delay Time (Note 11)	t <sub>D(on)</sub>	—	3.8	—	ns	V <sub>DD</sub> = -15V, V <sub>GS</sub> = -10V I <sub>D</sub> = -1A, R <sub>G</sub> ≅ 6.0Ω
Turn-On Rise Time (Note 11)	t <sub>r</sub>	—	6.5	—	ns	
Turn-Off Delay Time (Note 11)	t <sub>D(off)</sub>	—	37.1	—	ns	
Turn-Off Fall Time (Note 11)	t <sub>f</sub>	—	21.4	—	ns	

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

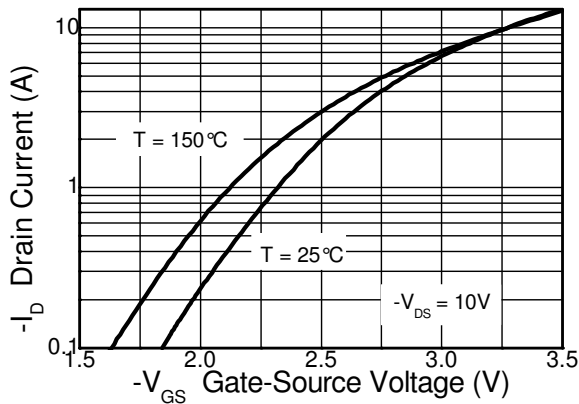
**Typical Characteristics**



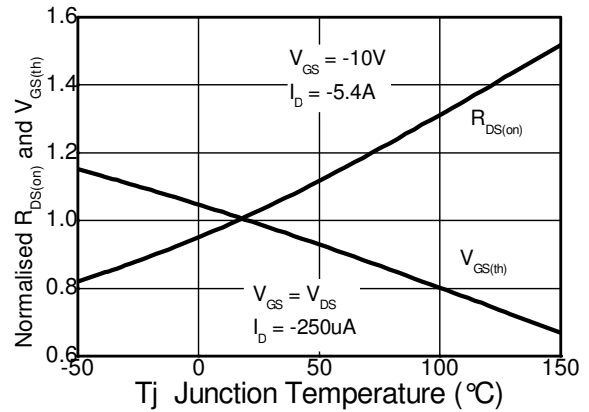
**Output Characteristics**



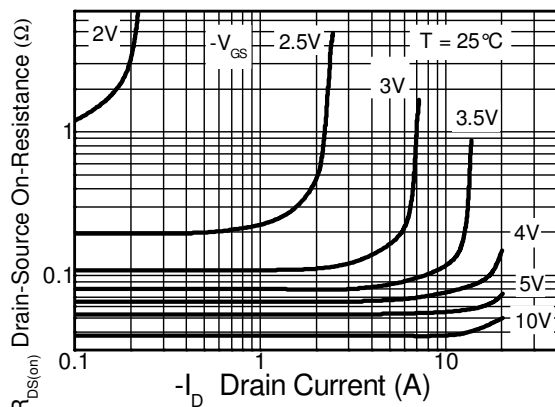
**Output Characteristics**



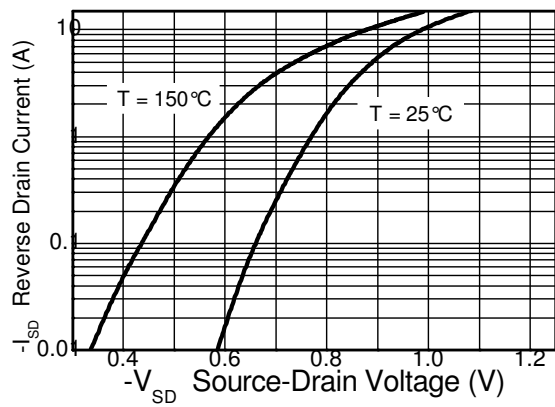
**Typical Transfer Characteristics**



**Normalised Curves v Temperature**

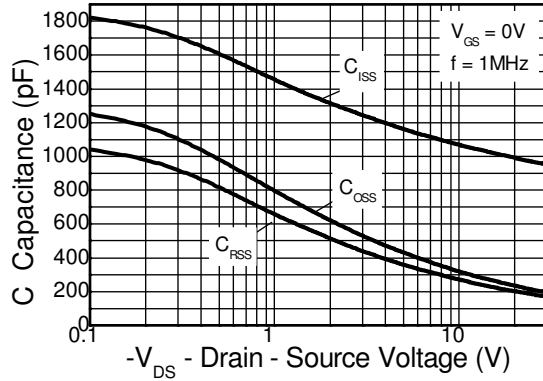


**On-Resistance v Drain Current**

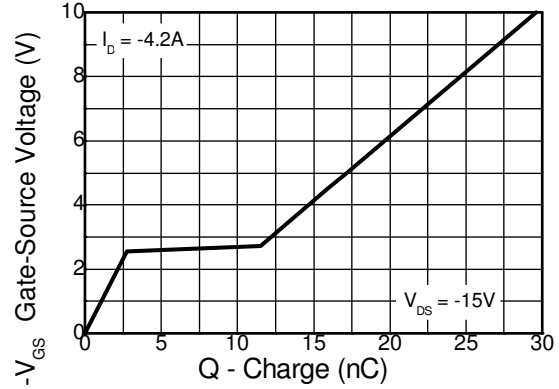


**Source-Drain Diode Forward Voltage**

**Typical Characteristics** (continued)

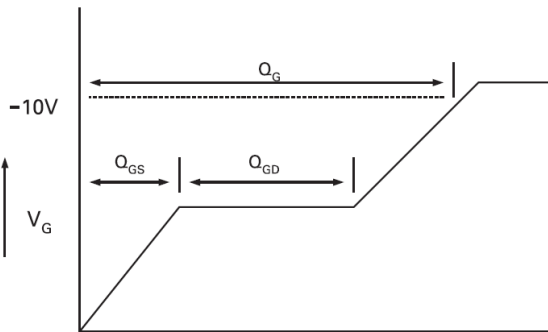


**Capacitance v Drain-Source Voltage**

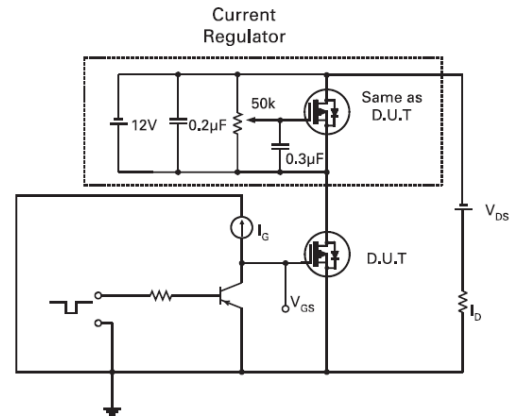


**Gate-Source Voltage v Gate Charge**

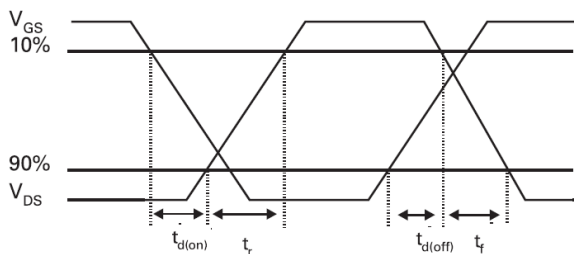
**Test Circuits**



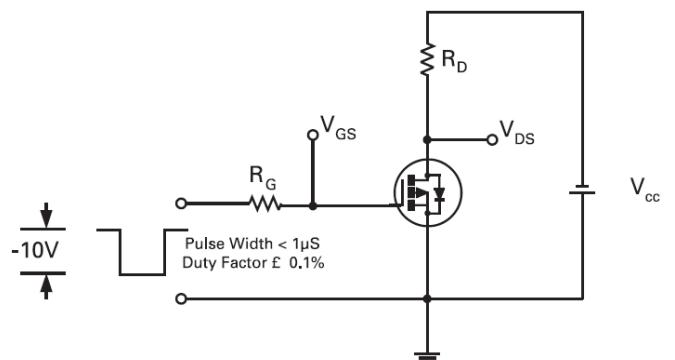
**Basic Gate Charge Waveform**



**Gate Charge Test Circuit**



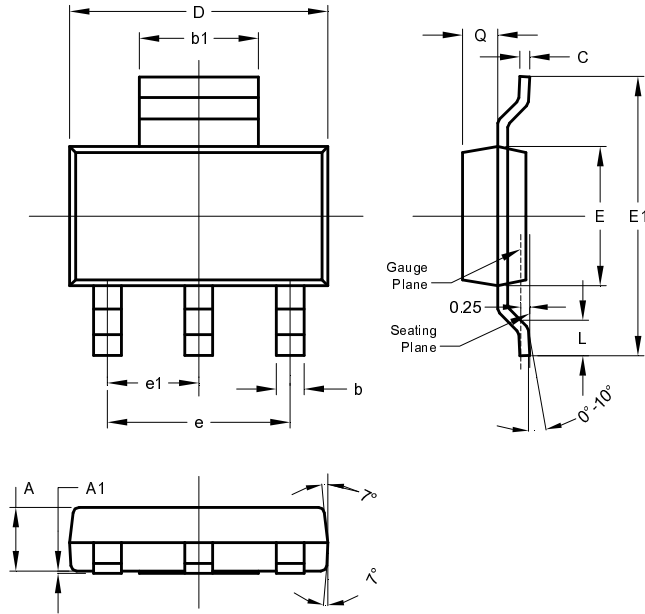
**Switching Time Waveforms**



**Switching Time Test Circuit**

**Package Outline Dimensions**

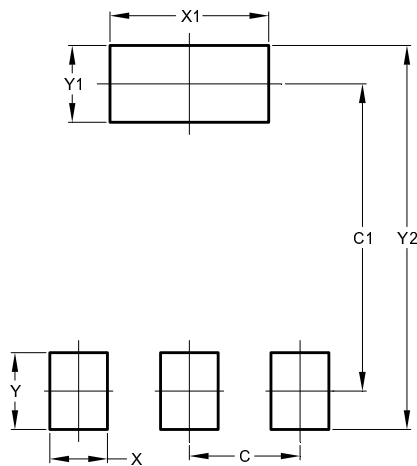
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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 AP02001 at <http://www.diodes.com/datasheets/ap02001.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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