

**ZXMP3A16G**

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

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(on) max}$	$I_D max$ $T_A = 25^\circ C$ (Notes 3)
-30V	45mΩ @ $V_{GS} = -10V$	-7.5A
	70mΩ @ $V_{GS} = -4.5V$	-5.9A

**Features and Benefits**

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- “Green” component. Lead Free Finish / RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

**Description and Applications**

This MOSFET has been 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

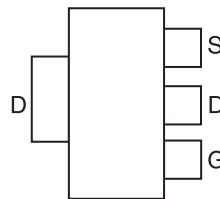
**Mechanical Data**

- 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 lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.112 grams (approximate)

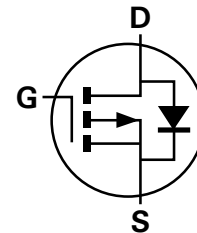
SOT223



Top View



Pin Out - Top View



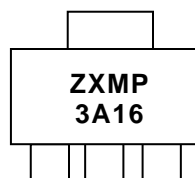
Equivalent Circuit

**Ordering Information** (Note 1)

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

Note: 1. 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**



ZXMP = Product Type Marking Code, Line 1  
3A16 = Product Type Marking Code, Line 2

**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

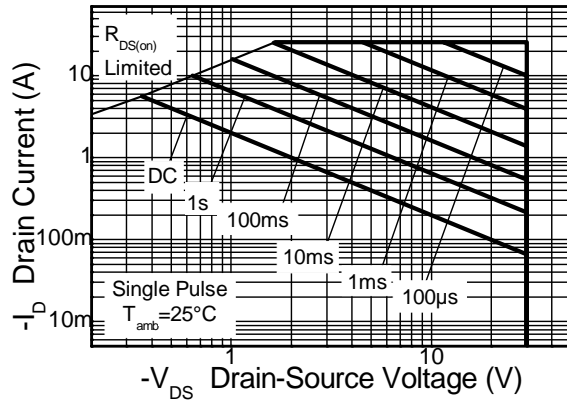
Characteristic		Symbol	Value	Unit	
Drain-Source voltage		$V_{DSS}$	-30	V	
Gate-Source voltage		$V_{GS}$	$\pm 20$	V	
Continuous Drain current	$V_{GS} = 10\text{V}$	(Note 3)	-7.5	A	
		$T_A = 70^\circ\text{C}$ (Note 3)	-6.0		
		(Note 2)	-5.4		
Pulsed Drain current	$V_{GS} = 10\text{V}$	(Note 4)	$I_{DM}$	-24.9	A
Continuous Source current (Body diode)		(Note 3)	$I_S$	-3.2	A
Pulsed Source current (Body diode)		(Note 4)	$I_{SM}$	-24.9	A

**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

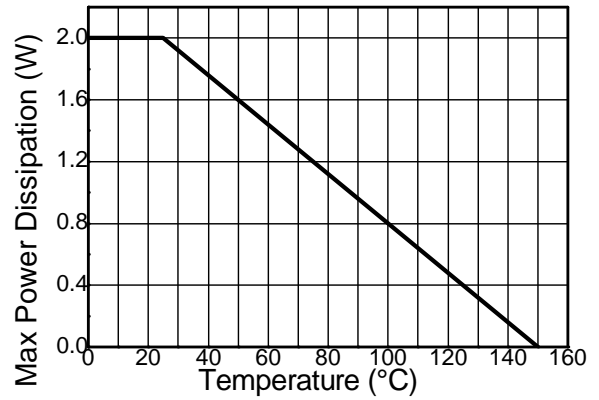
Characteristic		Symbol	Value	Unit
Power dissipation	(Note 2)	$P_D$	2.0	W
			16	
Linear derating factor	(Note 3)		3.9	
			31	
Thermal Resistance, Junction to Ambient	(Note 2)	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
	(Note 3)		32.2	
Thermal Resistance, Junction to Lead	(Note 5)	$R_{\theta JL}$	8.51	
Operating and storage temperature range		$T_J, T_{STG}$	-55 to 150	

- Notes:
2. 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.
  3. Same as note (2), except the device is measured at  $t \leq 10$  sec.
  4. Same as note (2), 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.
  5. Thermal resistance from junction to solder-point (at the end of the drain lead).

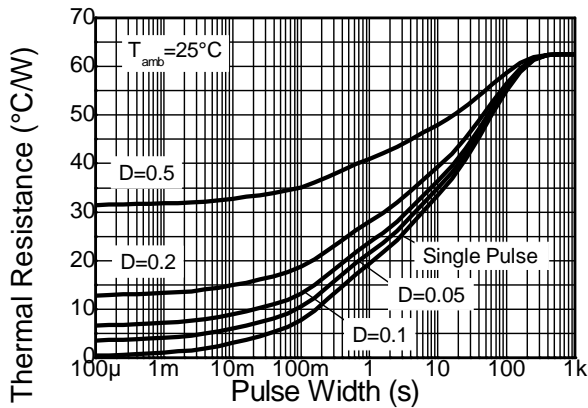
**Thermal Characteristics**



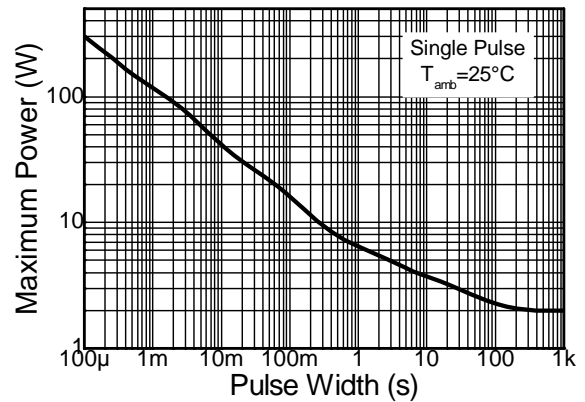
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



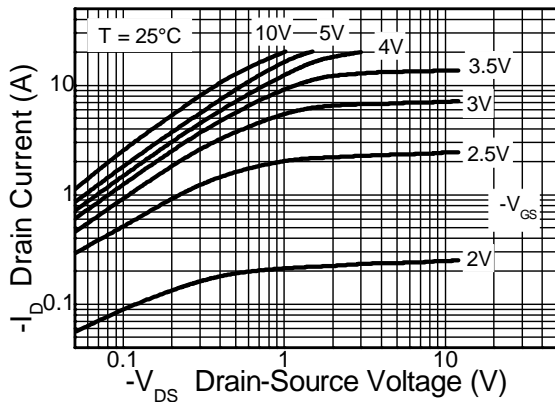
**Pulse Power Dissipation**

**Electrical Characteristics** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

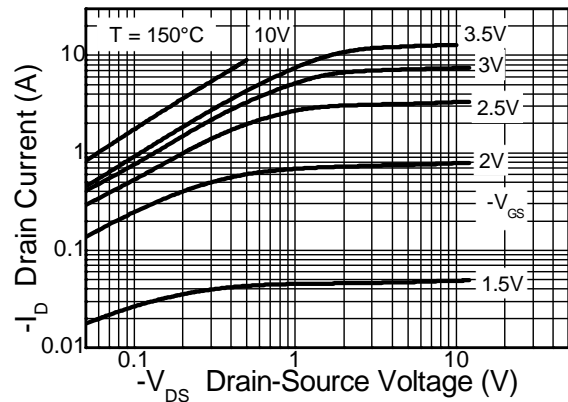
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-30	—	—	V	$I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	-1	$\mu\text{A}$	$V_{DS} = -30\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	—	—	V	$I_D = -250\mu\text{A}, V_{DS} = V_{GS}$
Static Drain-Source On-Resistance (Note 6)	$R_{DS(on)}$	—	—	45	m $\Omega$	$V_{GS} = -10\text{V}, I_D = -4.2\text{A}$
				70		$V_{GS} = -4.5\text{V}, I_D = -3.4\text{A}$
Forward Transconductance (Notes 6 & 7)	$g_{fs}$	—	9.2	—	S	$V_{DS} = -15\text{V}, I_D = -4.2\text{A}$
Diode Forward Voltage (Note 6)	$V_{SD}$	—	-0.85	-0.95	V	$I_S = -3.6\text{A}, V_{GS} = 0\text{V}, T_J = 25^\circ\text{C}$
Reverse recovery time (Note 7)	$t_{rr}$	—	21.7	—	ns	$I_F = -2\text{A}, di/dt = 100\text{A}/\mu\text{s}, T_J = 25^\circ\text{C}$
Reverse recovery charge (Note 7)	$Q_{rr}$	—	16.1	—	nC	$T_J = 25^\circ\text{C}$
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	$C_{iss}$	—	1022	—	pF	$V_{DS} = -15\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance	$C_{oss}$	—	267	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	229	—	pF	
Total Gate Charge (Note 8)	$Q_g$	—	17.2	—	nC	$V_{GS} = -5\text{V}$
Total Gate Charge (Note 8)	$Q_g$	—	29.6	—	nC	$V_{GS} = -10\text{V}$ $V_{DS} = -15\text{V}$ $I_D = -4.2\text{A}$
Gate-Source Charge (Note 8)	$Q_{gs}$	—	2.8	—	nC	
Gate-Drain Charge (Note 8)	$Q_{gd}$	—	8.6	—	nC	
Turn-On Delay Time (Note 8)	$t_{D(on)}$	—	3.8	—	ns	$V_{DD} = -15\text{V}, V_{GS} = -10\text{V}$ $I_D = -1\text{A}, R_G \cong 6.0\Omega$
Turn-On Rise Time (Note 8)	$t_r$	—	6.5	—	ns	
Turn-Off Delay Time (Note 8)	$t_{D(off)}$	—	37.1	—	ns	
Turn-Off Fall Time (Note 8)	$t_f$	—	21.4	—	ns	

- Notes:
6. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$
  7. For design aid only, not subject to production testing.
  8. Switching characteristics are independent of operating junction temperatures.

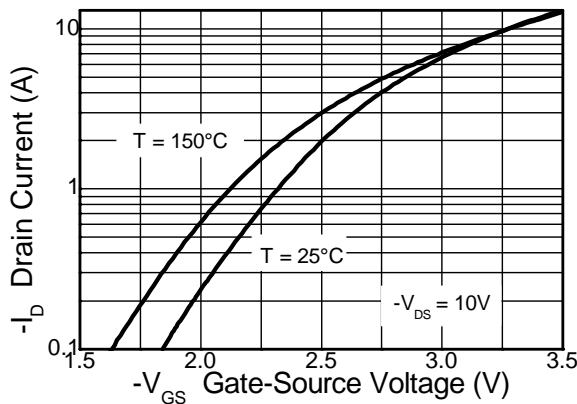
**Typical Characteristics**



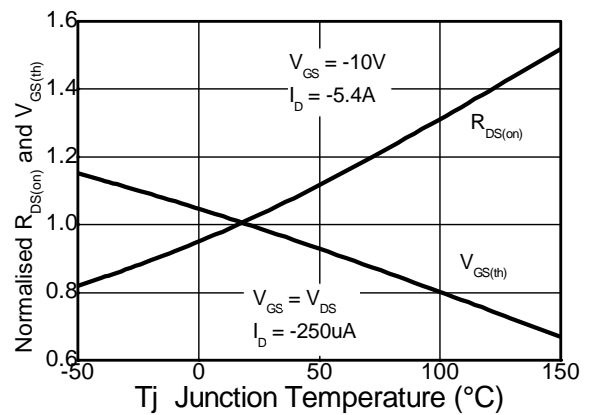
**Output Characteristics**



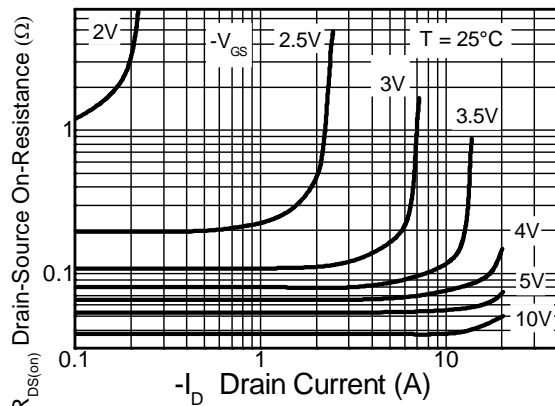
**Output Characteristics**



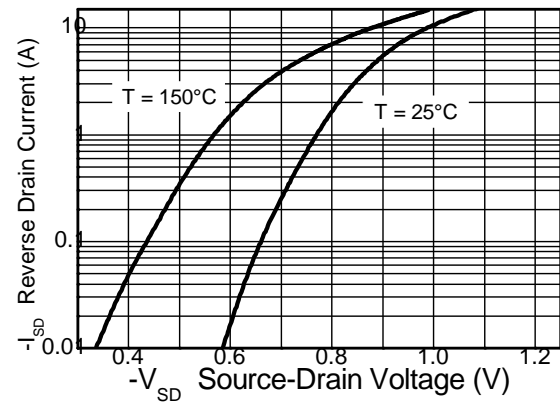
**Typical Transfer Characteristics**



**Normalised Curves v Temperature**

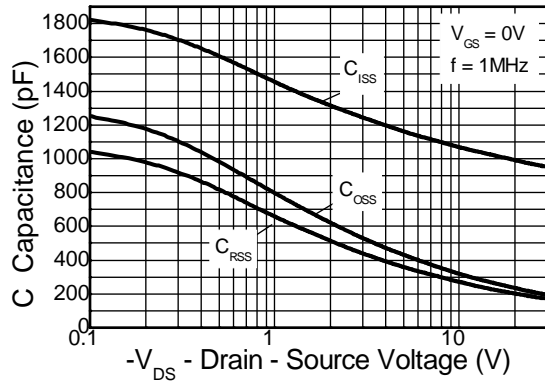


**On-Resistance v Drain Current**

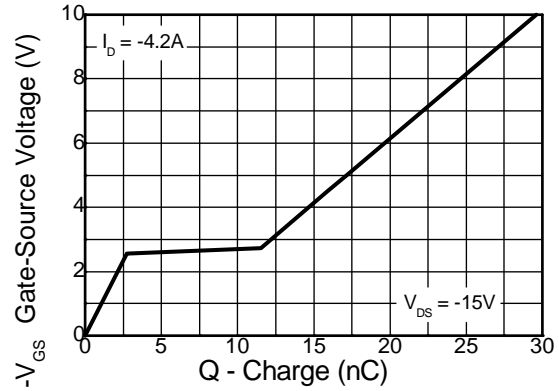


**Source-Drain Diode Forward Voltage**

**Typical Characteristics – continued**

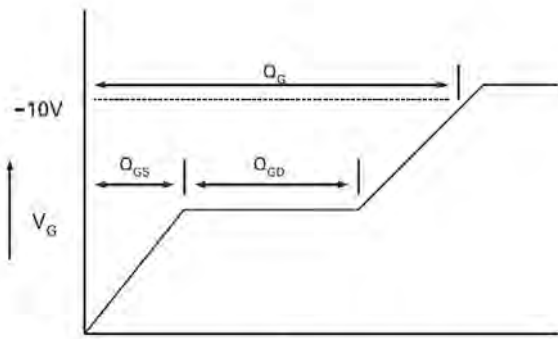


**Capacitance v Drain-Source Voltage**

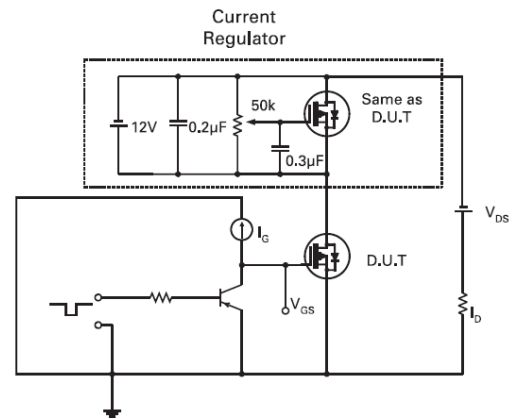


**Gate-Source Voltage v Gate Charge**

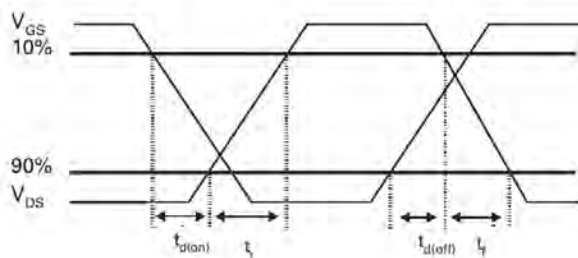
**Test Circuits**



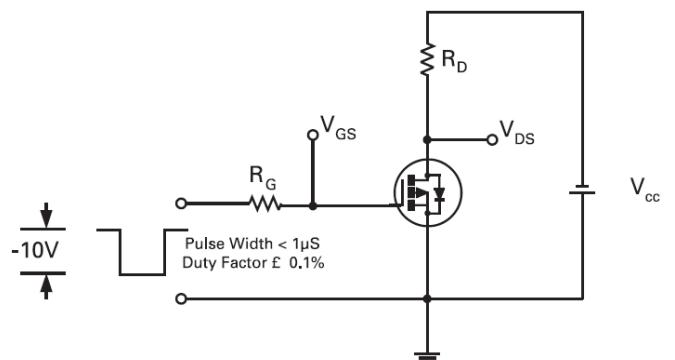
**Basic Gate Charge Waveform**



**Gate Charge Test Circuit**

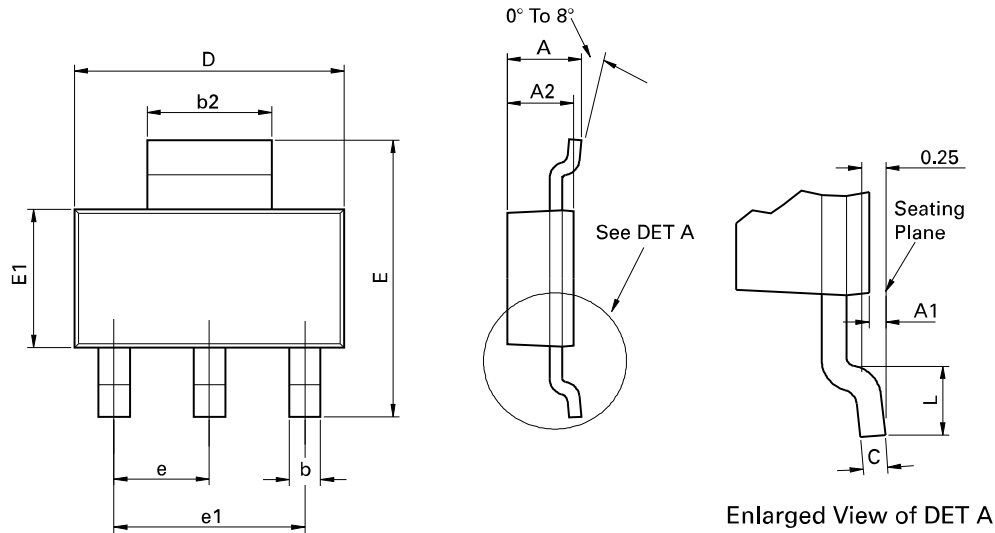


**Switching Time Waveforms**



**Switching Time Test Circuit**

**Package Outline Dimensions**

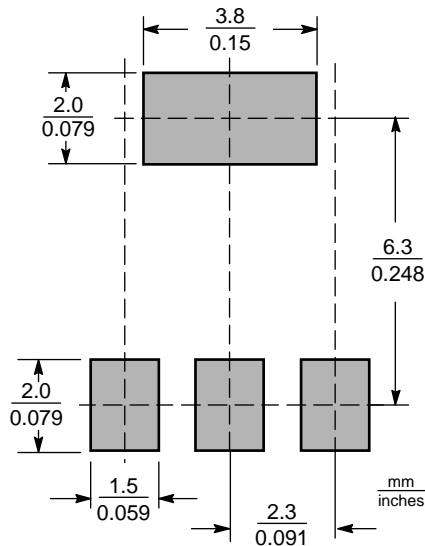


Conforms to JEDEC TO-261 AA Issue B

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	-	1.80	-	0.071	D	6.30	6.70	0.248	0.264
A1	0.02	0.10	0.0008	0.004	e	2.30 BSC		0.0905 BSC	
A2	1.55	1.65	0.0610	0.0649	e1	4.60 BSC		0.181 BSC	
b	0.66	0.84	0.026	0.033	E	6.70	7.30	0.264	0.287
b2	2.90	3.10	0.114	0.122	E1	3.30	3.70	0.130	0.146
C	0.23	0.33	0.009	0.013	L	0.90	-	0.355	-

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches.

**Suggested Pad Layout**



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