

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

**Product Summary**

$V_{(BR)DSS}$	Max $R_{DS(on)}$	Max $I_D$ $T_A = 25^\circ C$
-30V	75m $\Omega$ @ $V_{GS} = -10V$	-3.8A
	100m $\Omega$ @ $V_{GS} = -4.5V$	-3.3A

**Description**

This MOSFET utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed, making it ideal for high-efficiency power management applications.

**Applications**

- DC - DC converters
- Power management functions
- Disconnect switches
- Motor control

**Features**

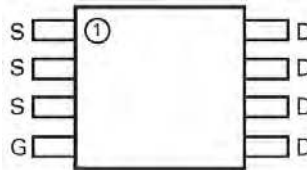
- Fast switching speed
- Low on-resistance
- Low threshold
- Low gate drive
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

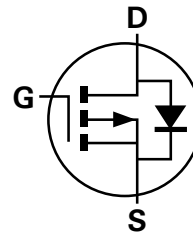
- Case: MSOP8
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish; Solderable per MIL-STD-202, Method 208
- Weight: 0.028 grams (approximate)



Top View



Top View  
Pin Out



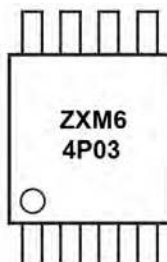
Equivalent Circuit

**Ordering Information** (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXM64P03XTA	ZXM64P03	7	12	1,000 Units

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See <http://www.diodes.com> 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>.

**Marking Information**



ZXM64P03 = Product Type Marking Code

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

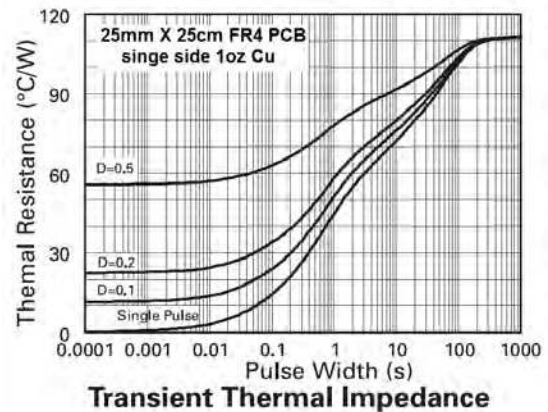
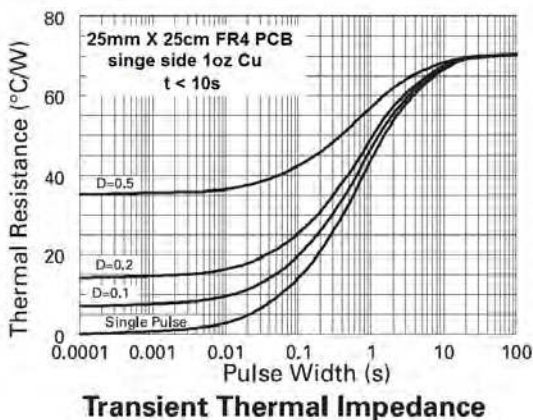
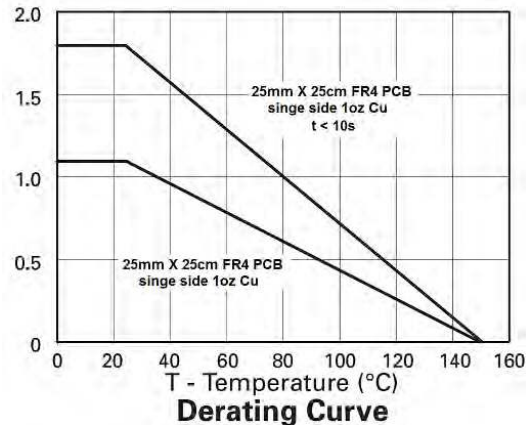
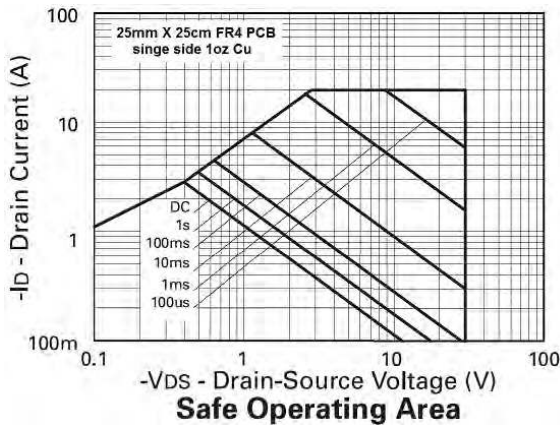
Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DSS}$	-30	V
Gate-Source Voltage			$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$V_{GS} = 4.5\text{V}$	$T_A = +25^\circ\text{C}$ (Note 5)	$I_D$	-3.8	A
		$T_A = +70^\circ\text{C}$ (Note 5)		-3.0	
Pulsed Drain Current (Note 7)			$I_{DM}$	-1.9	A
Continuous Source Current (Body Diode) (Note 6)			$I_S$	-2.3	A
Pulsed Source Current (Body Diode) (Note 7)			$I_{SM}$	-19	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	$P_D$	1.1	W
Linear Derating Factor		8.8	mW/ $^\circ\text{C}$
Power Dissipation (Note 6)	$P_D$	1.8	W
Linear Derating Factor		14.4	mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	113	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	70	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient (Note 8)	$R_{\theta JL}$	39.8	$^\circ\text{C}/\text{W}$
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 FR4 PCB with high coverage of single sided 1oz copper, in still air conditions
  6. For a device surface mounted on FR4 PCB measured at  $t \leq 10$  secs.
  7. Repetitive rating pulse width limited by pulse current limited by maximum junction temperature.
  8. Thermal resistance from junction to solder-point (at the end of the Drain lead).

**Thermal Characteristics**

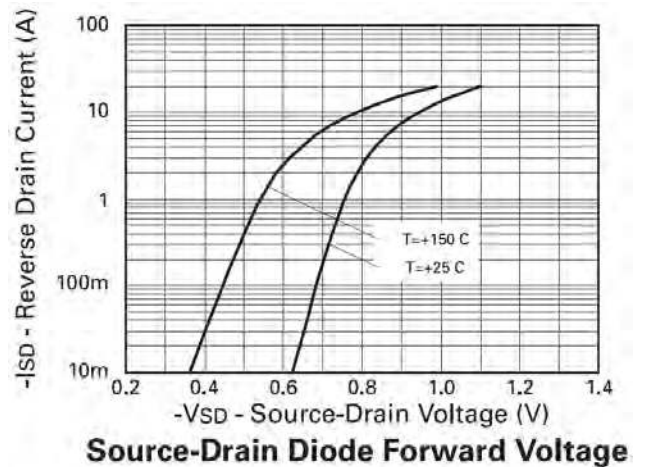
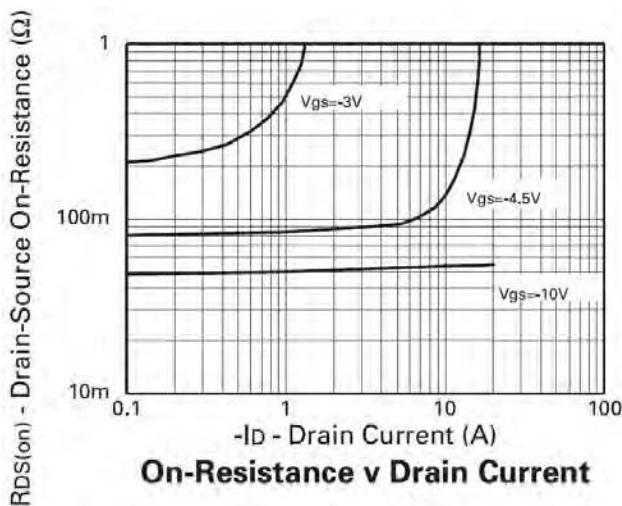
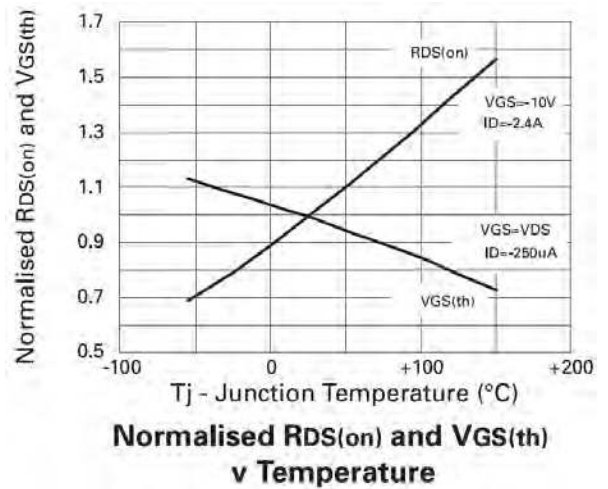
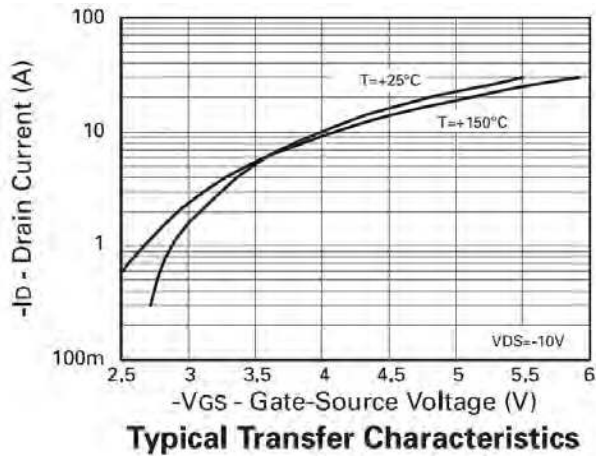
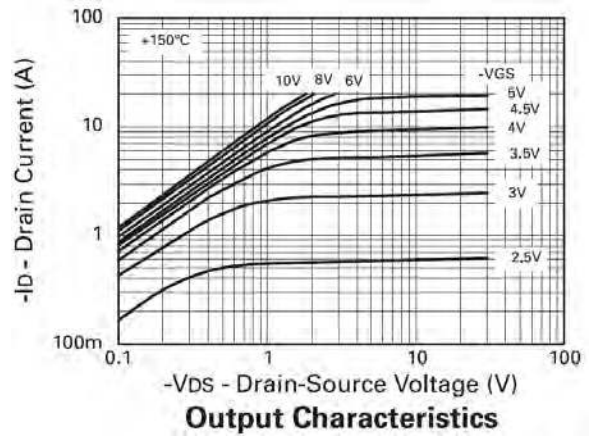
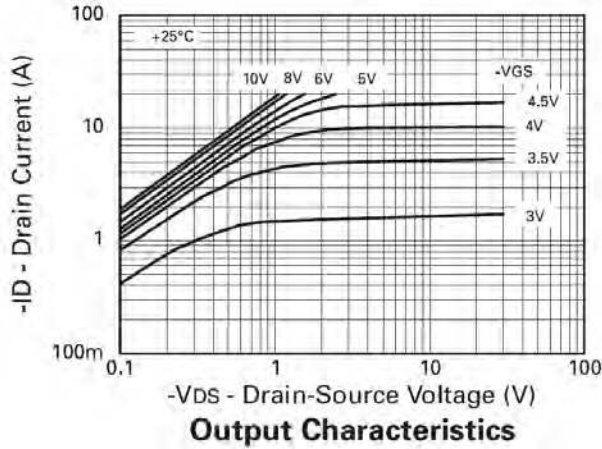


**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

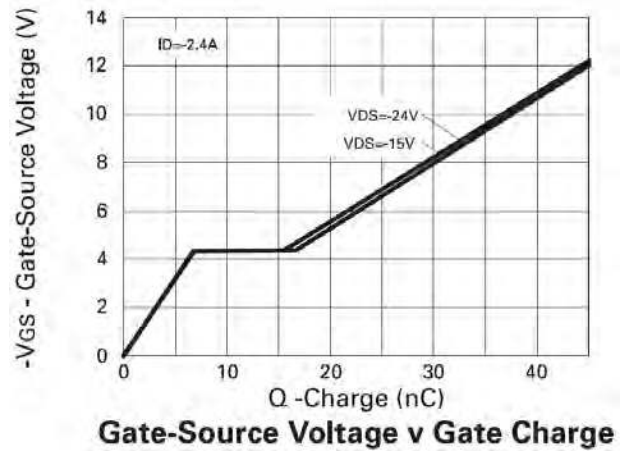
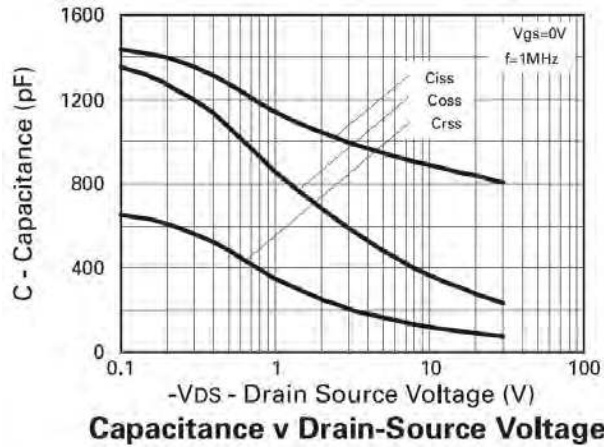
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-30	—	—	V	$I_D = -250\mu\text{A}$ , $V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	-1	$\mu\text{A}$	$V_{DS} = -30\text{V}$ , $V_{GS} = 0\text{V}$
Gate-Source 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 9)	$R_{DS(on)}$	—	—	75	m $\Omega$	$V_{GS} = -10\text{V}$ , $I_D = -2.4\text{A}$
				100		$V_{GS} = -4.5\text{V}$ , $I_D = -1.2\text{A}$
Forward Transconductance (Notes 9 and 11)	$g_{fs}$	2.3	—	—	S	$V_{DS} = -10\text{V}$ , $I_D = -1.2\text{A}$
Diode Forward Voltage (Note 9)	$V_{SD}$	—	—	-0.95	V	$T_J = +25^\circ\text{C}$ , $I_S = -2.4\text{A}$ , $V_{GS} = 0\text{V}$
Reverse Recovery Time (Note 11)	$t_{rr}$	—	30.2	—	ns	$T_J = +25^\circ\text{C}$ , $I_F = -2.4\text{A}$ ,
Reverse Recovery Charge (Note 11)	$Q_{rr}$	—	27.8	—	nC	$di/dt = 100\text{A}/\mu\text{s}$
<b>DYNAMIC CHARACTERISTICS (Note 11)</b>						
Input Capacitance	$C_{iss}$	—	825	—	pF	$V_{DS} = -25\text{V}$ , $V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	250	—		
Reverse Transfer Capacitance	$C_{rss}$	—	80	—		
Turn-On Delay Time (Note 10)	$t_{d(on)}$	—	4.4	—	ns	$V_{DD} = -15\text{V}$ , $I_D = -2.4\text{A}$ , $R_G = 6.2\Omega$ , $R_D = 6.2\Omega$ (Refer to test circuit)
Turn-On Rise Time (Note 10)	$t_r$	—	6.2	—		
Turn-Off Delay Time (Note 10)	$t_{d(off)}$	—	40	—		
Turn-Off Fall Time (Note 10)	$t_f$	—	29.2	—		
Total Gate Charge (Note 10)	$Q_g$	—	—	46	nC	$V_{DS} = -24\text{V}$ , $V_{GS} = -10\text{V}$ , $I_D = -2.4\text{A}$ (Refer to test circuit)
Gate-Source Charge (Note 10)	$Q_{gs}$	—	—	9		
Gate-Drain Charge (Note 10)	$Q_{gd}$	—	—	11.5		

- Notes:
- 9. Measured under pulsed conditions. Pulse width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .
  - 10. Switching characteristics are independent of operating junction temperature.
  - 11. For design aid only, not subject to production testing.

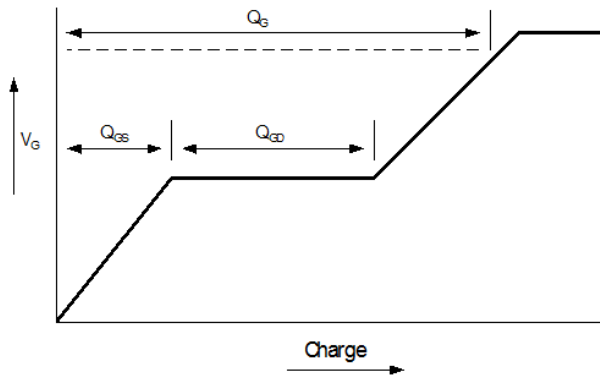
**Typical Characteristics**



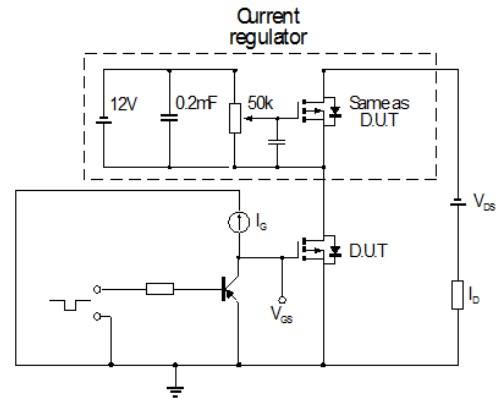
**Typical Characteristics - continued**



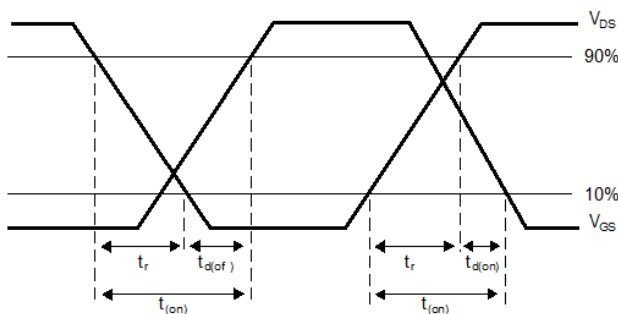
**Test Circuits**



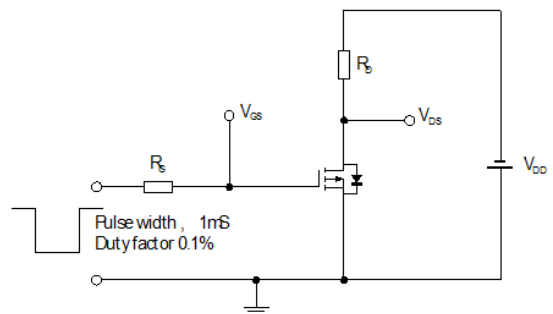
**Basic gate charge waveform**



**Gate charge test circuit**



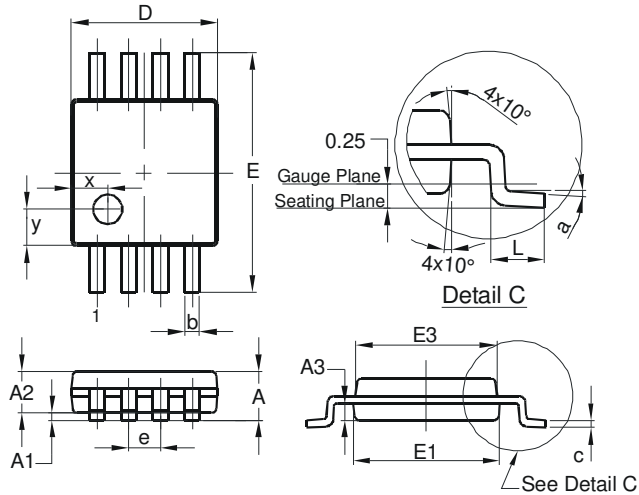
**Switching time waveforms**



**Switching time test circuit**

## Package Outline Dimensions

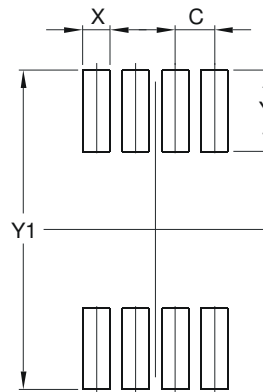
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



MSOP-8			
Dim	Min	Max	Typ
A	-	1.10	-
A1	0.05	0.15	0.10
A2	0.75	0.95	0.86
A3	0.29	0.49	0.39
b	0.22	0.38	0.30
c	0.08	0.23	0.15
D	2.90	3.10	3.00
E	4.70	5.10	4.90
E1	2.90	3.10	3.00
E3	2.85	3.05	2.95
e	-	-	0.65
L	0.40	0.80	0.60
a	0°	8°	4°
x	-	-	0.750
y	-	-	0.750
<b>All Dimensions in mm</b>			

## Suggested Pad Layout

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



Dimensions	Value (in mm)
C	0.650
X	0.450
Y	1.350
Y1	5.300

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