

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ $T_A = +25^\circ C$
-20V	600mΩ @ $V_{GS} = -4.5V$	-0.92A
	900mΩ @ $V_{GS} = -2.7V$	-0.75A

### Description and Applications

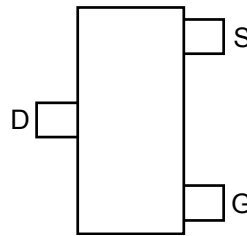
This MOSFET utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed, making it ideal for high-efficiency power management applications.

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

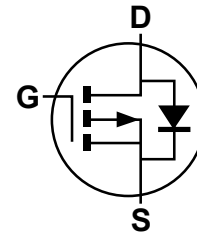
SOT23



Top View



Top View  
Pin Out



Equivalent Circuit

### Features and Benefits

- 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

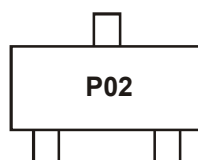
- Case: SOT23
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish; Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (approximate)

### Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXM61P02FTA	P02	7	8	3000 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/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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>

### Marking Information



P02 = Product Type Marking Code

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

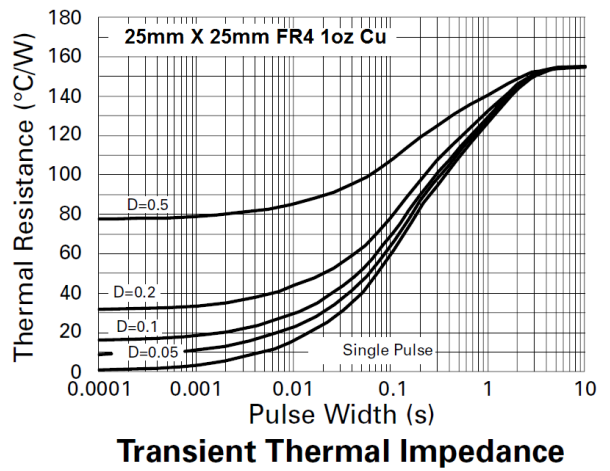
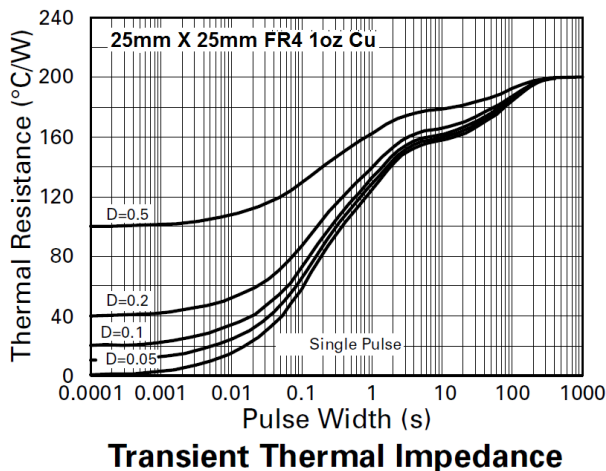
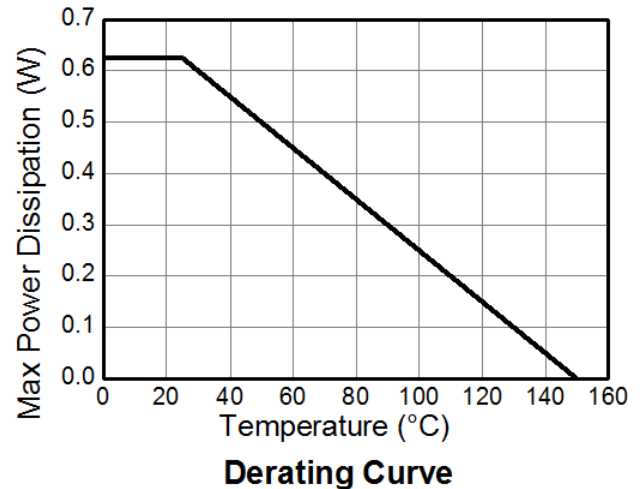
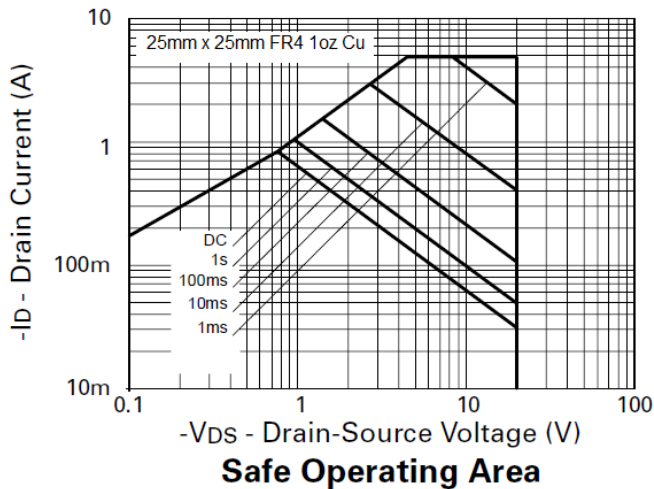
Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	-20	V
Gate-Source Voltage			V <sub>GS</sub>	±12	V
Continuous Drain Current	V <sub>GS</sub> = 4.5V	T <sub>A</sub> = +25°C (Note 6)	I <sub>D</sub>	-0.9	A
		T <sub>A</sub> = +70°C (Note 6)		-0.7	
Pulsed Drain Current (Note 7)			I <sub>DM</sub>	-4.9	A
Continuous Source Current (Body Diode) (Note 6)			I <sub>S</sub>	-0.9	A
Pulsed Source Current (Body Diode) (Note 7)			I <sub>SM</sub>	-4.9	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	625	mW
Linear Derating Factor		5	mW/°C
Power Dissipation (Note 6)	P <sub>D</sub>	806	mW
Linear Derating Factor		6.4	mW/°C
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	200	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	155	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°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 ≤ 5 secs.
  7. Repetitive rating 25mm x 25mm FR4 PCB, D=0.05 pulse width=10µs - pulse current limited by maximum junction temperature.

**Thermal Characteristics**

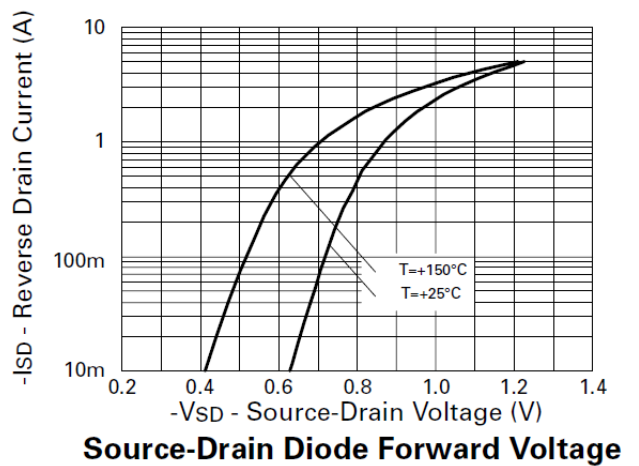
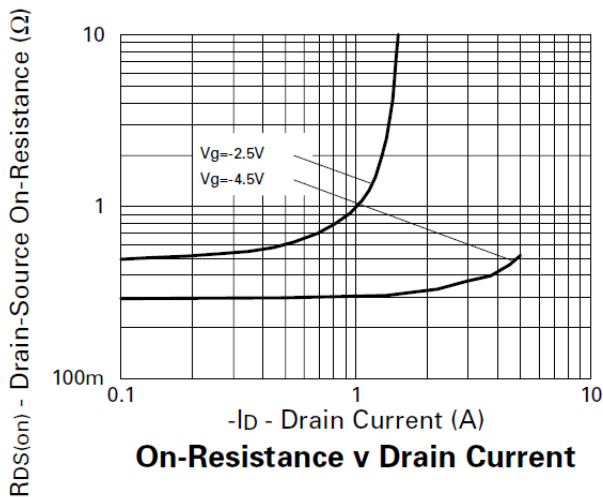
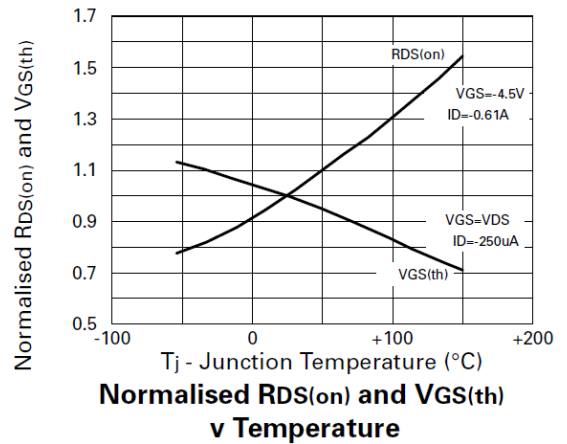
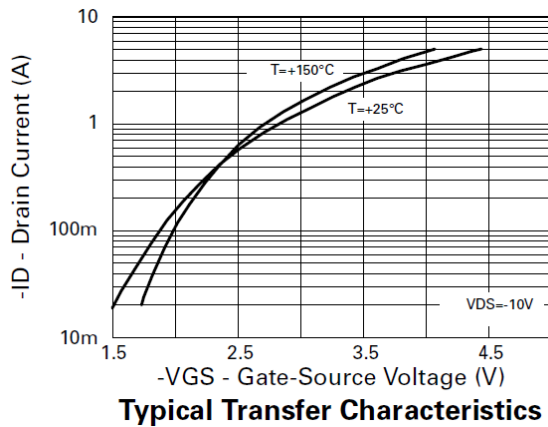
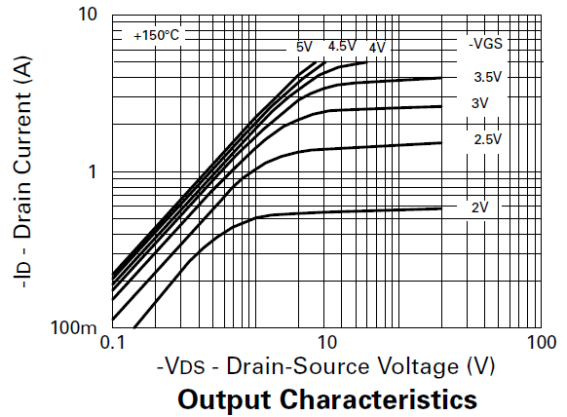
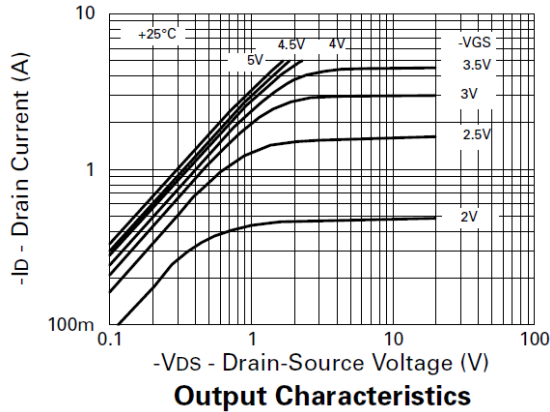


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

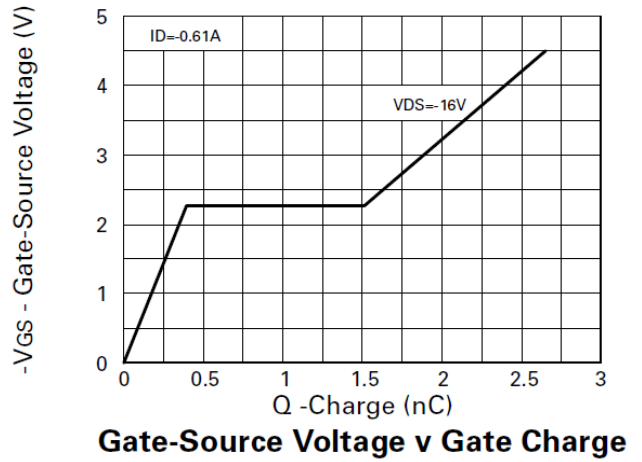
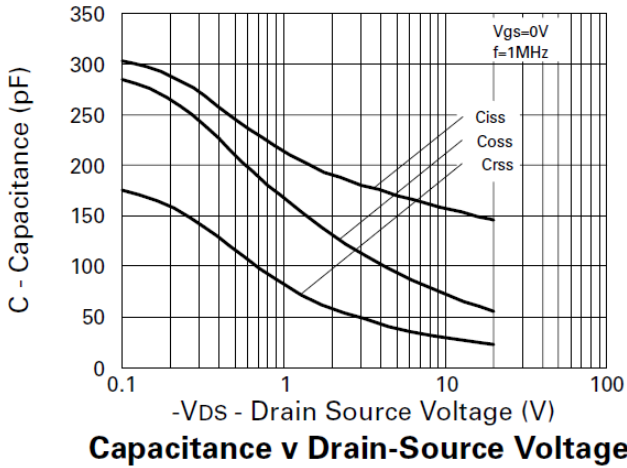
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	—	—	V	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-0.1	μA	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.7	—	-1.5	V	I <sub>D</sub> = -250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 8)	R <sub>DS(on)</sub>	—	—	0.6	Ω	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -0.61A
				0.9		V <sub>GS</sub> = -2.7V, I <sub>D</sub> = -0.31A
Forward Transconductance (Notes 8 and 10)	g <sub>fs</sub>	0.56	—	—	S	V <sub>DS</sub> = -10V, I <sub>D</sub> = -0.31A
Diode Forward Voltage (Note 8)	V <sub>SD</sub>	—	—	-0.95	V	T <sub>J</sub> = +25°C, I <sub>S</sub> = -0.61A, V <sub>GS</sub> = 0V
Reverse Recovery Time (Note 10)	t <sub>rr</sub>	—	14.9	—	ns	T <sub>J</sub> = +25°C, I <sub>F</sub> = -0.61A,
Reverse Recovery Charge (Note 10)	Q <sub>rr</sub>	—	5.6	—	nC	di/dt = 100A/μs
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	C <sub>iSS</sub>	—	150	—	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	70	—		
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	30	—		
Turn-On Delay Time (Note 9)	t <sub>d(on)</sub>	—	2.9	—	ns	V <sub>DD</sub> = -110V, I <sub>D</sub> = -0.93A, R <sub>G</sub> ≅ 6.2Ω, R <sub>D</sub> ≅ 11Ω,
Turn-On Rise Time (Note 9)	t <sub>r</sub>	—	6.7	—		
Turn-Off Delay Time (Note 9)	t <sub>d(off)</sub>	—	11.2	—		
Turn-Off Fall Time (Note 9)	t <sub>f</sub>	—	10.1	—		
Total Gate Charge (Note 9)	Q <sub>g</sub>	—	3.5	—	nC	V <sub>DS</sub> = -16V, V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -0.61A
Gate-Source Charge (Note 9)	Q <sub>gs</sub>	—	0.5	—		
Gate-Drain Charge (Note 9)	Q <sub>gd</sub>	—	1.5	—		

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

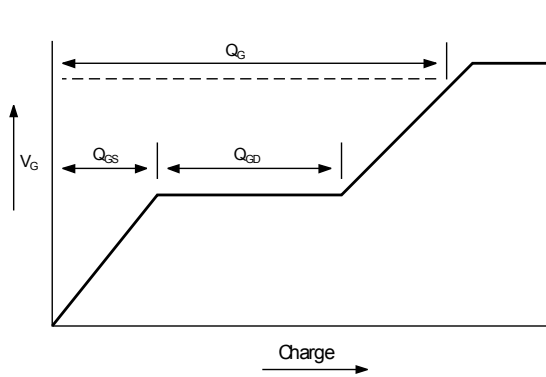
**Typical Characteristics**



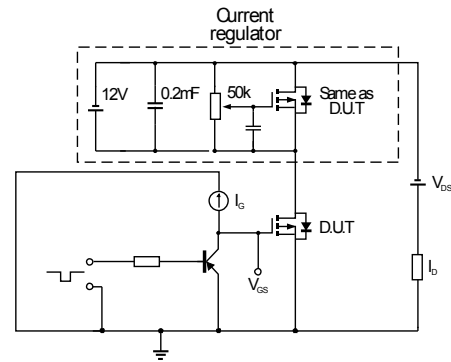
**Typical Characteristics - continued**



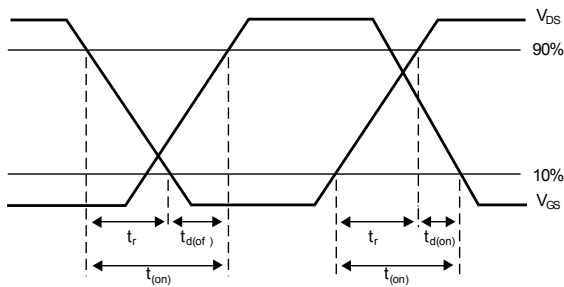
**Test Circuits**



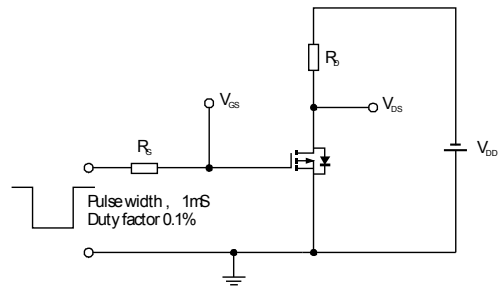
**Basic gate charge waveform**



**Gate charge test circuit**



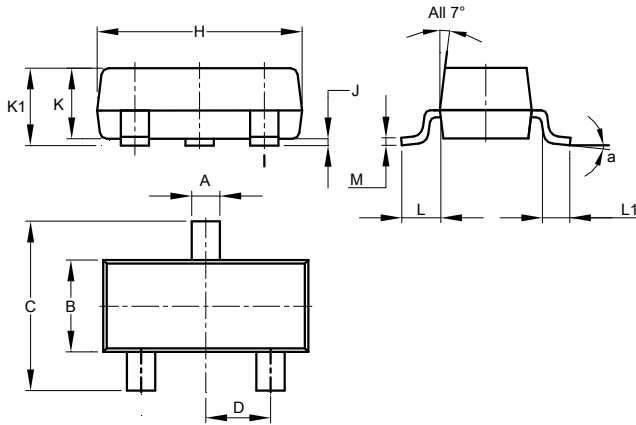
**Switching time waveforms**



**Switching time test circuit**

**Package Outline Dimensions**

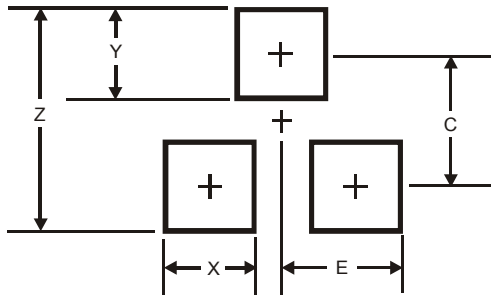
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	8°		
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)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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