

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = +25^\circ\text{C}$
60V	0.04Ω @ $V_{GS} = 10\text{V}$	7.5A
	0.06Ω @ $V_{GS} = 4.5\text{V}$	6.2A

## Description

This new generation trench MOSFET features a unique structure combining the benefits of low on-resistance and fast switching, making it ideal for high efficiency power management applications.

## Applications

- DC-DC Converters
- Power Management Functions
- Disconnect Switches
- Motor Control

## Features and Benefits

- High Voltage
- Low On-resistance
- Fast Switching Speed
- Low Gate Drive
- Low Threshold
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

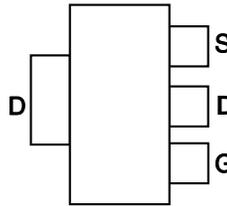
## Mechanical Data

- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.112 grams (Approximate)

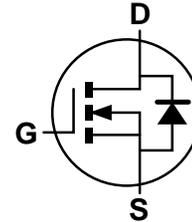
SOT223



Top View



Pin Out - Top



Equivalent Circuit

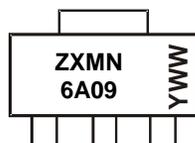
## Ordering Information (Note 4)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN6A09GTA	ZXMN6A09	7	12	1,000

- 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information

SOT223



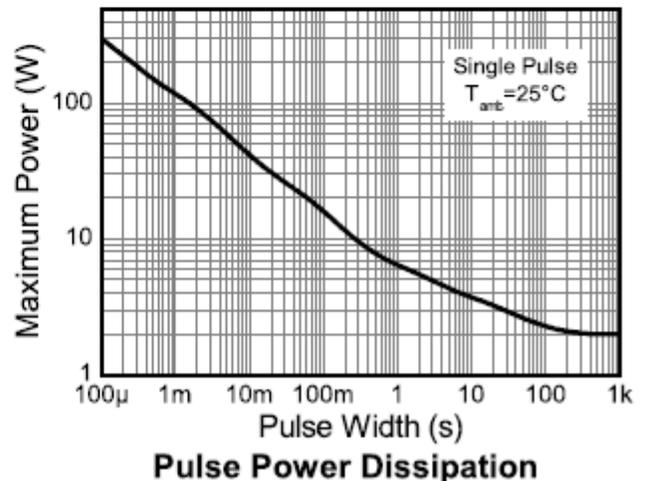
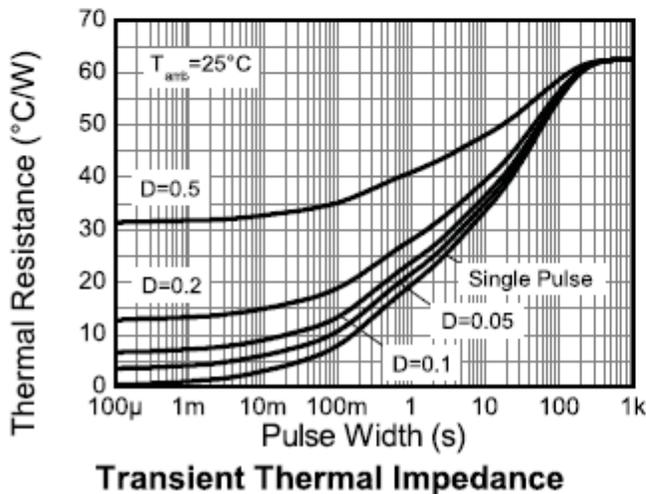
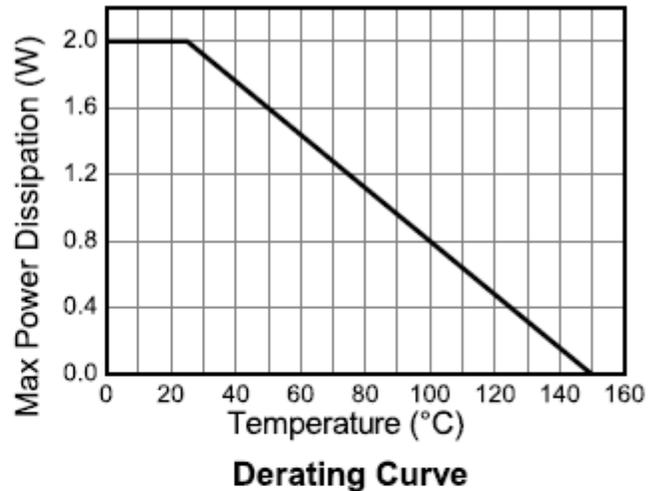
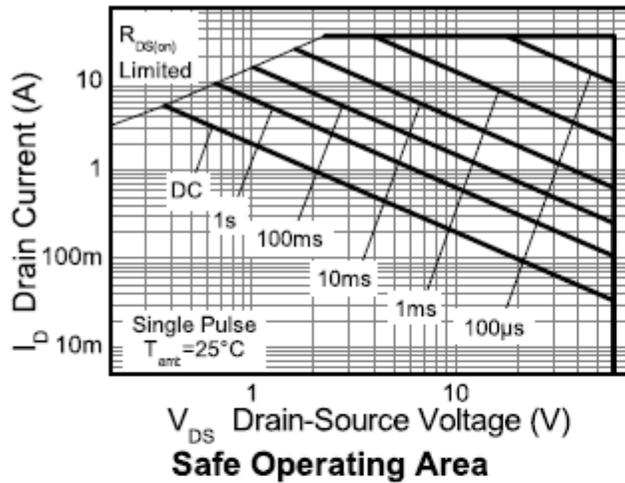
ZXMN6A09 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 5 = 2015)  
 WW or  $\bar{W}\bar{W}$  = Week Code (01~53)

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	60	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current @V <sub>GS</sub> = 10V; T <sub>A</sub> = +25°C (Note 6)	I <sub>D</sub>	7.5	A
		6	
		5.4	
Pulsed Drain Current (Note 7)	I <sub>DM</sub>	33	A
Continuous Source Current (Body Diode) (Note 6)	I <sub>S</sub>	3.5	A
Pulsed Source Current (Body Diode) (Note 7)	I <sub>SM</sub>	33	A

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

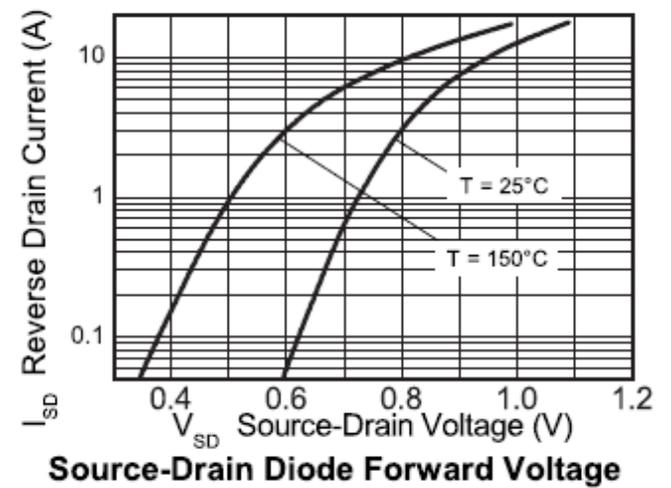
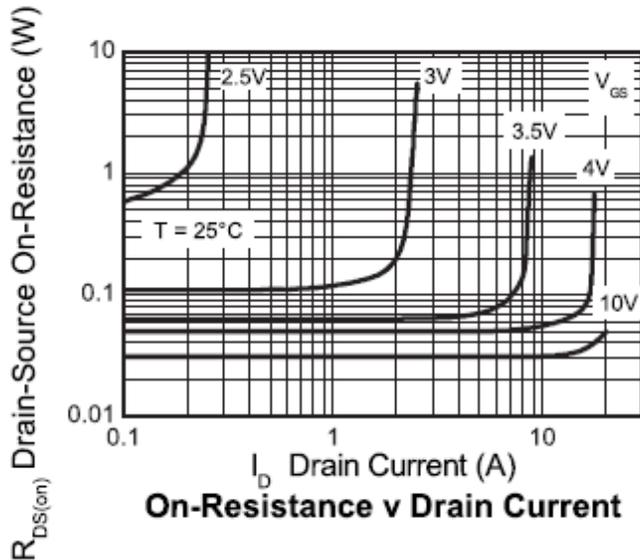
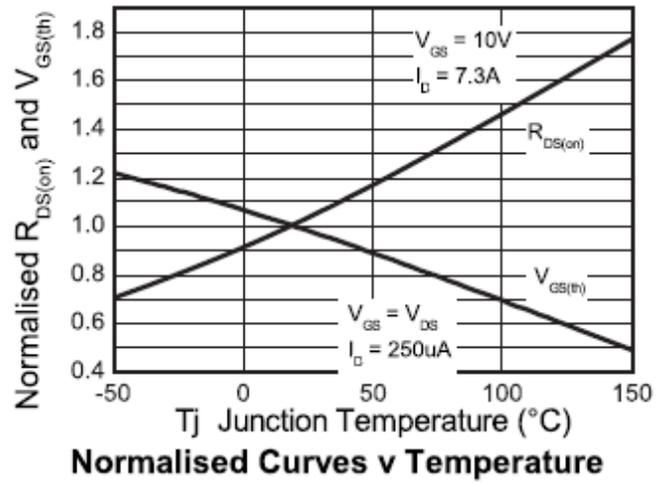
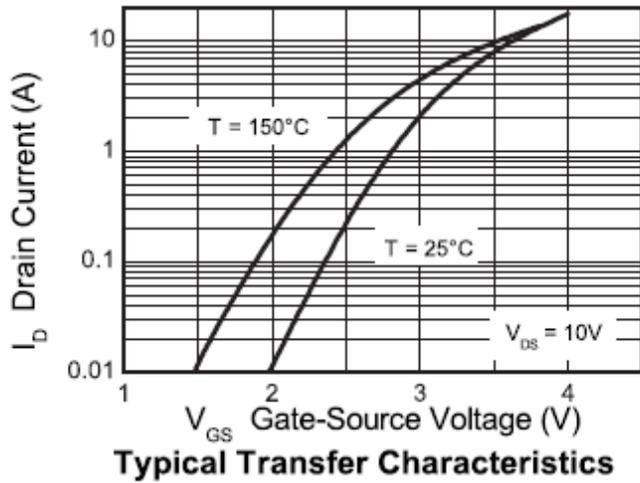
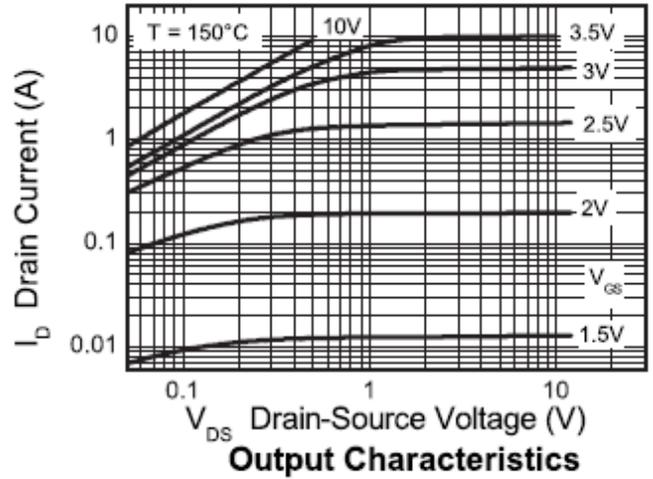
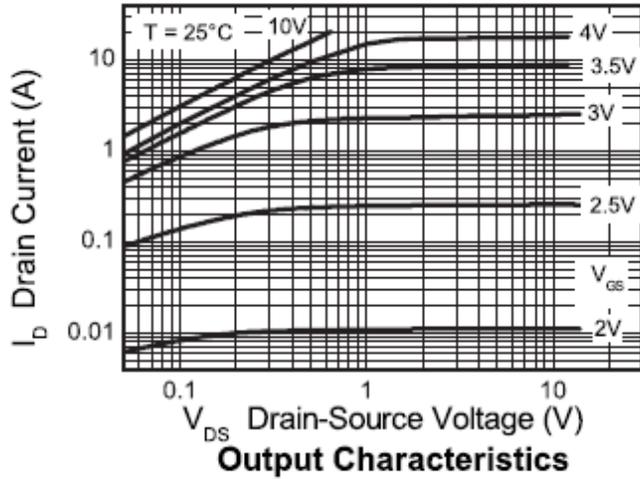
Characteristic	Symbol	Value	Unit
Power Dissipation at T <sub>A</sub> = +25°C (Note 5)	P <sub>D</sub>	2.0	W
Linear Derating Factor		16	mW/°C
Power Dissipation at T <sub>A</sub> = +25°C (Note 6)	P <sub>D</sub>	3.9	W
Linear Derating Factor		31	mW/°C
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	62.5	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	32.2	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

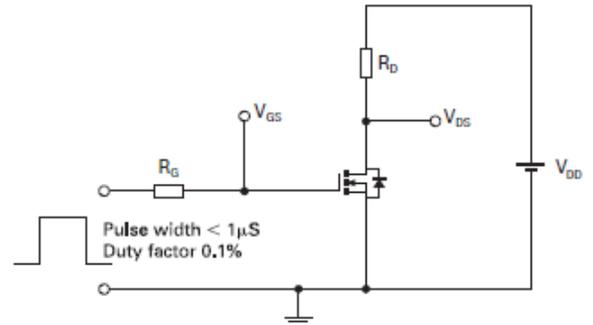
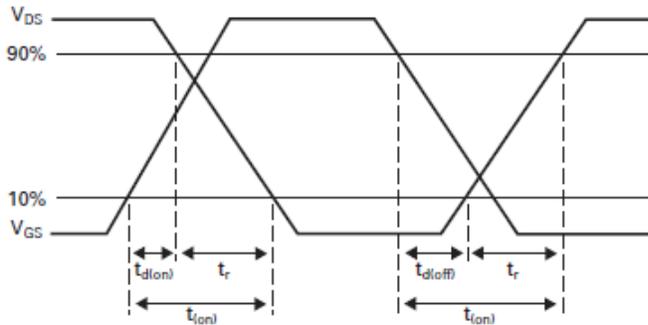
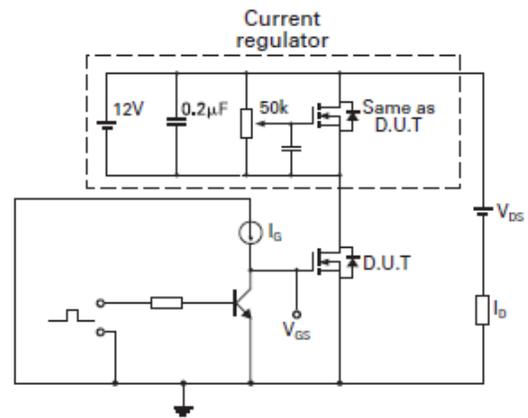
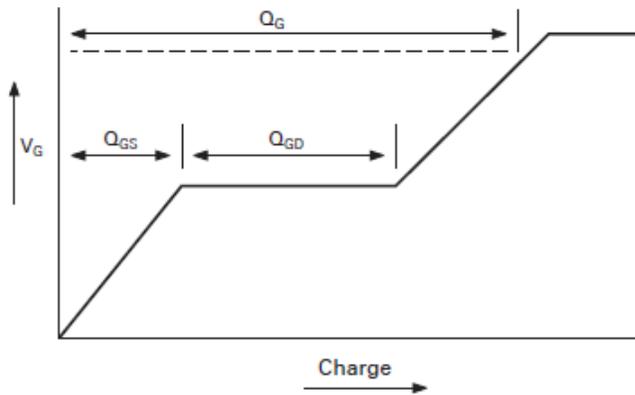
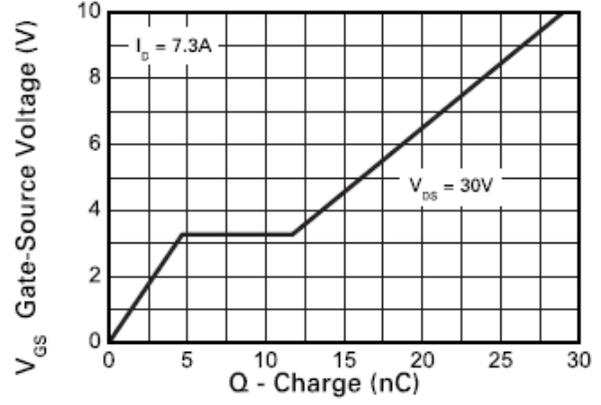
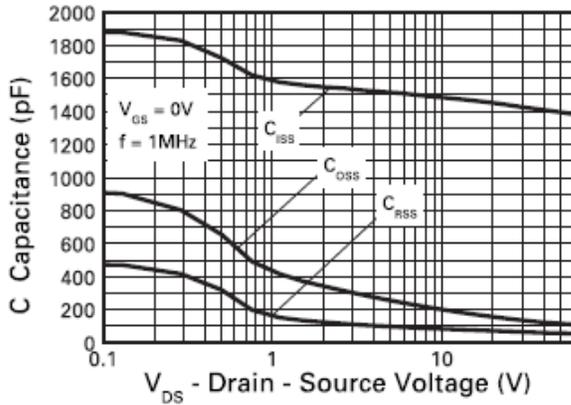


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> = 60V, 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	-	3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance (Note 8)	R <sub>DS(ON)</sub>	-	-	0.04	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 8.2A
		-	-	0.06	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 7.4A
Forward Transconductance (Notes 8 & 10)	g <sub>fs</sub>	-	15	-	mS	V <sub>DS</sub> = 15V, I <sub>D</sub> = 8.2A
Diode Forward Voltage (Note 8)	V <sub>SD</sub>	-	0.85	0.95	V	I <sub>S</sub> = 6.6A, V <sub>GS</sub> = 0V, T <sub>J</sub> = +25°C
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance (Note 10)	C <sub>iss</sub>	-	1407	-	pF	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance (Note 10)	C <sub>oss</sub>	-	121	-	pF	
Reverse Transfer Capacitance (Note 10)	C <sub>rss</sub>	-	59	-	pF	
Total Gate Charge (Notes 9 & 10) V <sub>GS</sub> = 5V	Q <sub>g</sub>	-	12.4	-	nC	V <sub>DS</sub> = 15V I <sub>D</sub> = 3.5A
Total Gate Charge (Notes 9 & 10) V <sub>GS</sub> = 10V	Q <sub>g</sub>	-	24.2	-	nC	
Gate-Source Charge (Notes 9 & 10)	Q <sub>gs</sub>	-	5.2	-	nC	
Gate-Drain Charge (Notes 9 & 10)	Q <sub>gd</sub>	-	3.5	-	nC	
Turn-On Delay Time (Notes 9 & 10)	t <sub>D(ON)</sub>	-	4.9	-	ns	V <sub>DD</sub> = 15V, I <sub>D</sub> = 3.5A, V <sub>GS</sub> = 5V
Turn-On Rise Time (Note 9 & 10)	t <sub>R</sub>	-	5.0	-	ns	
Turn-Off Delay Time (Notes 9 & 10)	t <sub>D(OFF)</sub>	-	25.3	-	ns	
Turn-Off Fall Time (Notes 9 & 10)	t <sub>F</sub>	-	4.6	-	ns	
Reverse Recovery Time (Note 10)	t <sub>RR</sub>	-	26.3	-	ns	I <sub>F</sub> = 3.5A, di/dt = 100A/μs, T <sub>J</sub> = +25°C
Reverse Recovery Charge (Note 10)	Q <sub>rr</sub>	-	26.6	-	nC	

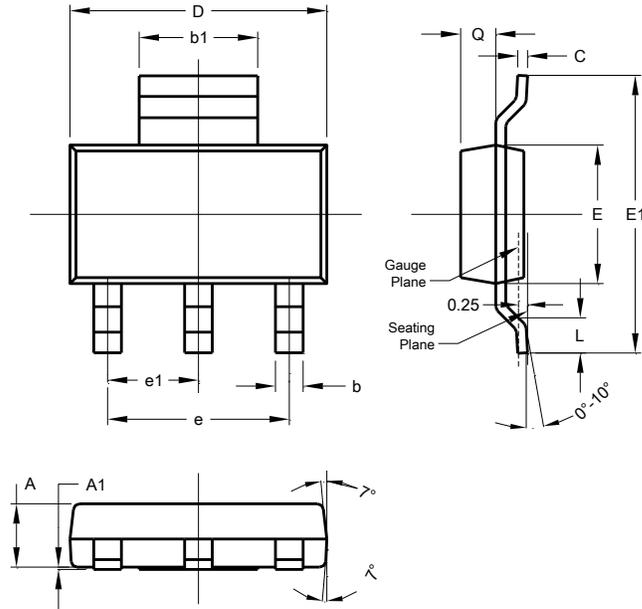
- Notes:
5. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  6. For a device surface mounted on FR4 PCB measured at t ≤ 10 secs.
  7. Repetitive rating 25mm x 25mm FR4 PCB, D=0.02 pulse width=300μs - pulse width limited by maximum junction temperature.
  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.





**Package Outline Dimensions**

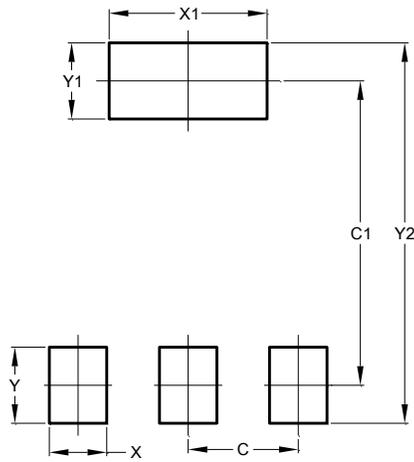
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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