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**60V SOT223 N-channel enhancement mode MOSFET**

**Product Summary**

BV <sub>DSS</sub>	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
60V	0.08 @ V <sub>GS</sub> = 10V	5.3
	0.15 @ V <sub>GS</sub> = 4.5V	2.8

**Description and Applications**

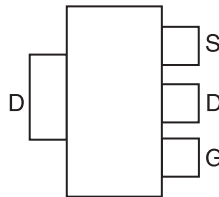
This MOSFET features a unique structure combining the benefits of low on-resistance and fast switching, making it ideal for high-efficiency power management applications.

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

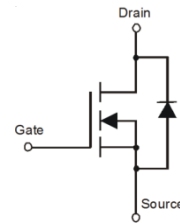
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

**Features and Benefits**

- Low On-Resistance
- Fast Switching Speed
- 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: SOT223
- Case Material: Molded Plastic.  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Solderable per MIL-STD-202, Method 208③
- Weight: 0.112 grams (Approximate)

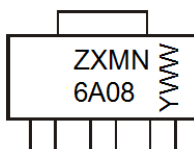
**Ordering Information** (Note 4)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN6A08GTA	ZXMN6A08	7	12	1,000
ZXMN6A08GTC	ZXMN6A08	13	12	4,000

- 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**

SOT223



ZXMN6A08 =Product Type Marking Code  
 YWW = Date Code Marking  
 Y or Y= Last Digit of Year (ex: 5 = 2015)  
 WW or WW = Week Code (01 - 53)

## Absolute Maximum Ratings

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current $V_{GS} = 10V$	$I_D$	$T_A = +25^\circ C$ (Note 6)	A
		$T_A = +70^\circ C$ (Note 6)	A
		$T_A = +25^\circ C$ (Note 5)	A
Pulsed Drain Current (Note 7)	$I_{DM}$	20	A
Continuous Source Current (body diode) (Note 6)	$I_S$	2.1	A
Pulsed Source Current (body diode) (Note 7)	$I_{SM}$	20	A
Power Dissipation at $T_A = +25^\circ C$ (Note 5)	$P_D$	2	W
Linear Derating Factor		16	mW/ $^\circ C$
Power Dissipation at $T_A = +25^\circ C$ (Note 6)	$P_D$	3.9	W
Linear Derating Factor		31	mW/ $^\circ C$
Linear Derating Factor	$T_J, T_{STG}$	-55 to +150	$^\circ C$

## Thermal Characteristics (@ $T_A = +25^\circ C$ , unless otherwise specified.)

Characteristic	Symbol	Value	Units
Junction to Ambient (Note 5)	$R_{\theta JA}$	62.5	$^\circ C/W$
Junction to Ambient (Note 6)	$R_{\theta JA}$	32	$^\circ C/W$

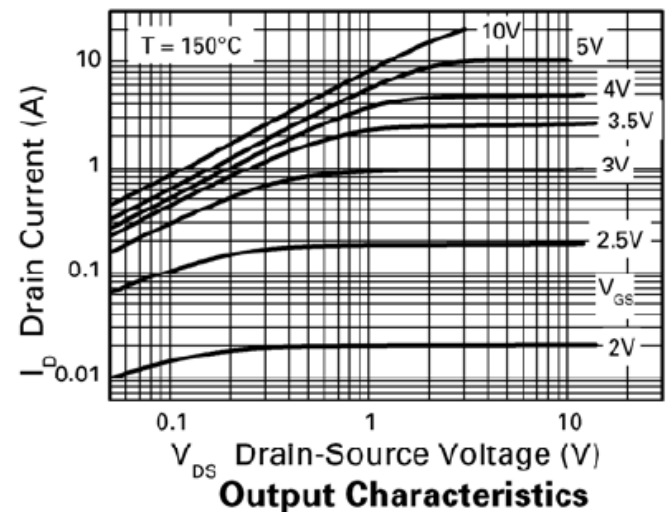
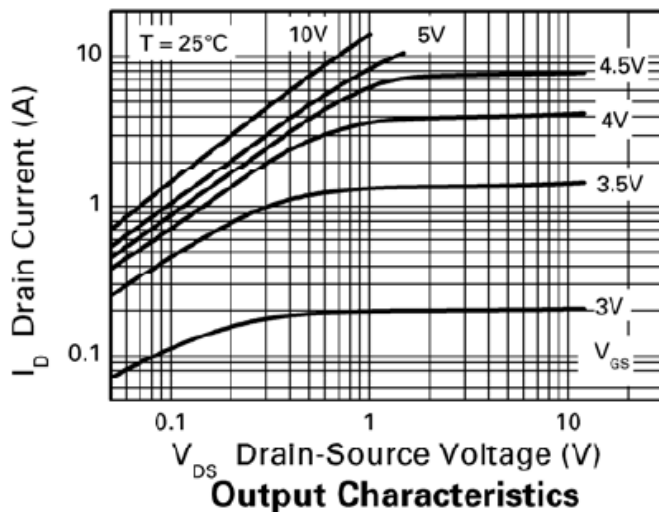
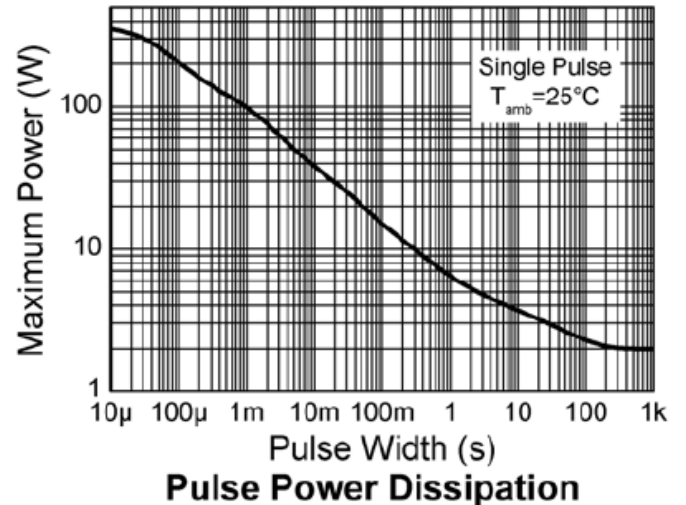
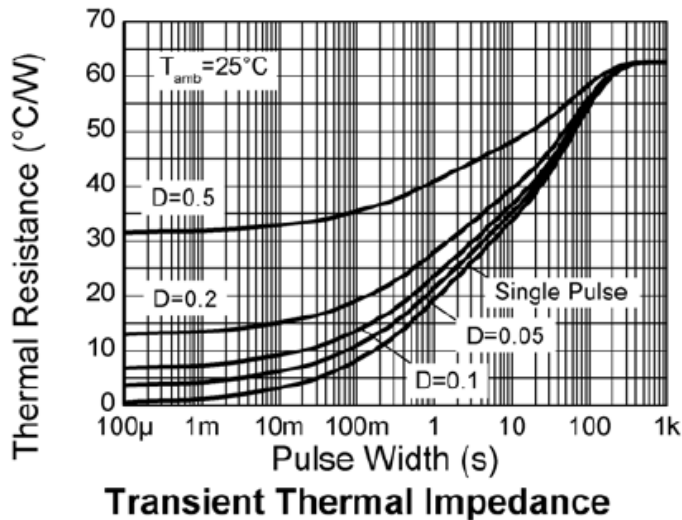
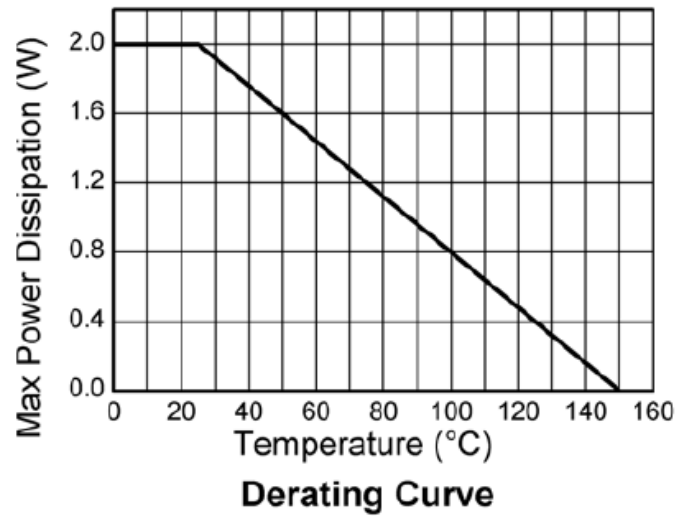
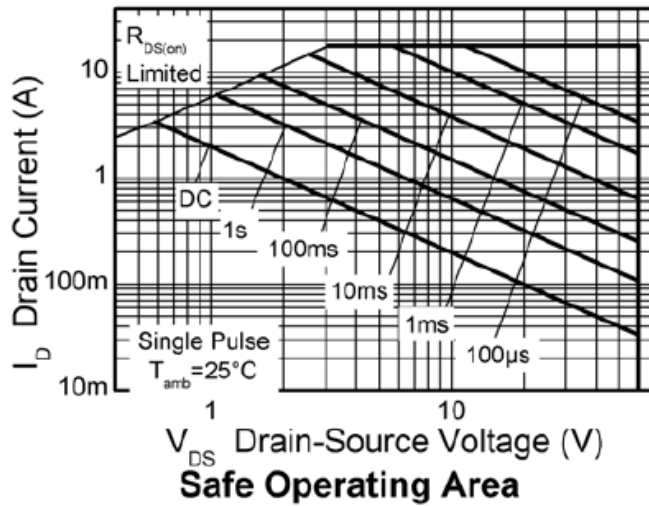
## Electrical Characteristics (@ $T_A = +25^\circ C$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	$BV_{DSS}$	60	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	0.5	$\mu A$	$V_{DS} = 60V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	—	—	100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	1	—	—	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Static Drain-Source On-State Resistance (Note 8)	$R_{DS(on)}$	—	—	0.08	$\Omega$	$V_{GS} = 10V, I_D = 4.8A$
		—	—	0.15	$\Omega$	$V_{GS} = 4.5V, I_D = 4.2A$
Forward Transconductance (Notes 8 & 10)	$g_{fs}$	—	6.6	—	S	$V_{DS} = 15V, I_D = 4.8A$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	$C_{iss}$	—	459	—	pF	$V_{DS} = 40V, V_{GS} = 0V,$ $f = 1MHz$
Output Capacitance	$C_{oss}$	—	44.2	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	24.1	—	pF	
Turn-On Delay Time (Note 9)	$t_{D(on)}$	—	2.6	—	ns	$V_{DD} = 30V, I_D = 1.5A$ $RG \approx 6.0\Omega, V_{GS} = 10V$
Turn-On Rise Time (Note 9)	$t_r$	—	2.1	—	ns	
Turn-Off Delay Time (Note 9)	$t_{D(off)}$	—	12.3	—	ns	
Turn-Off Fall Time (Note 9)	$t_f$	—	4.6	—	ns	
Gate Charge (Note 9)	$Q_g$	—	4.0	—	nC	$V_{DS} = 30V, V_{GS} = 5V$ $I_D = 1.4A$
Total Gate Charge (Note 9)	$Q_g$	—	5.8	—	nC	$V_{DS} = 30V, V_{GS} = 10V$ $I_D = 1.4A$
Gate-Source Charge (Note 9)	$Q_{gs}$	—	1.4	—	nC	
Gate Drain Charge (Note 9)	$Q_{gd}$	—	1.9	—	nC	
SOURCE-DRAIN DIODE						
Diode Forward Voltage (Note 8)	$V_{SD}$	—	0.88	1.2	V	$T_j = +25^\circ C, I_S = 4A,$ $V_{GS} = 0V$
Reverse Recovery Time (Note 10)	$t_{rr}$	—	19.2	—	ns	$T_j = +25^\circ C, I_S = 1.4A,$ $di/dt = 100A/\mu s$
Reverse Recovery Charge (Note 10)	$Q_{rr}$	—	30.3	—	nC	

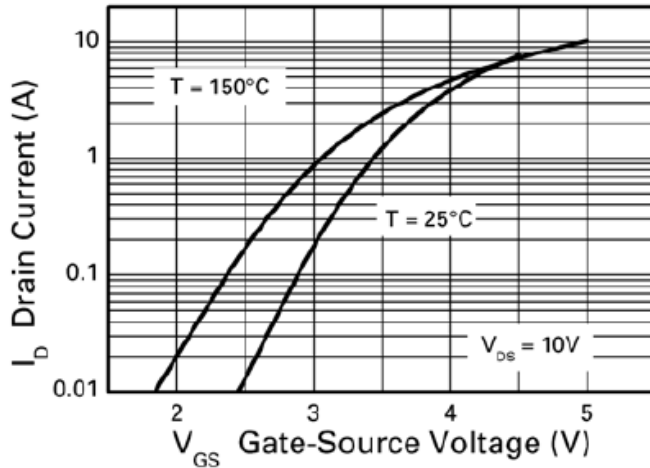
- Notes:
- For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  - For a device surface mounted on FR4 PCB measured at  $t \leq 10$  sec.
  - Repetitive rating - 25mm x 25mm FR4 PCB,  $D=0.02$ , pulse width 300\_s - pulse width limited by maximum junction temperature.
  - Measured under pulsed conditions. Pulse width  $\leq 300_s$ ; duty cycle  $\leq 2\%$ .
  - Switching characteristics are independent of operating junction temperature.
  - For design aid only, not subject to production testing.



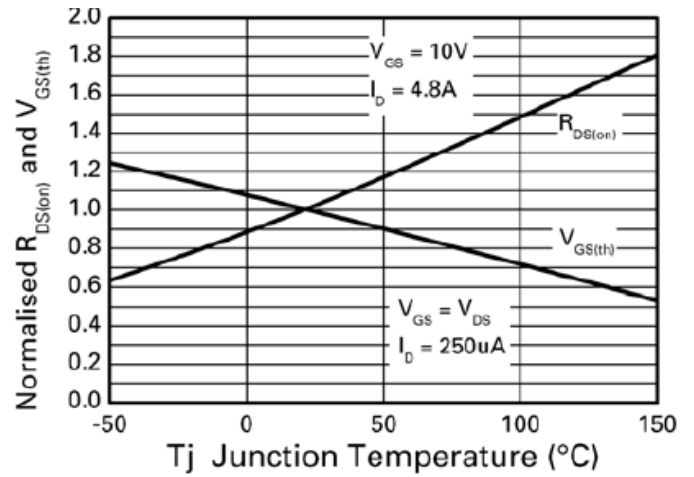
## Typical Characteristics



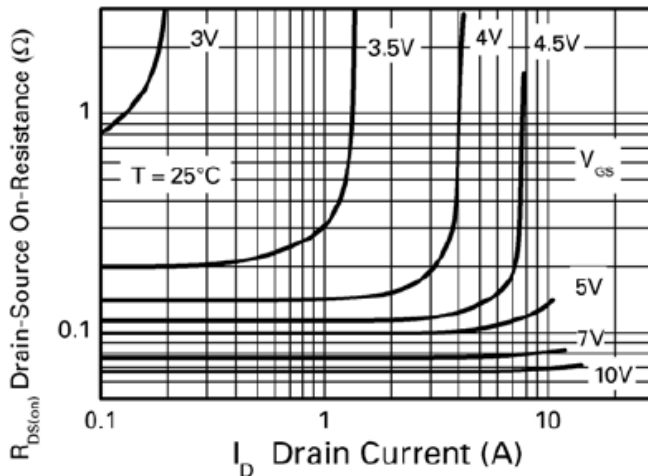
**Typical Characteristics** (continued)



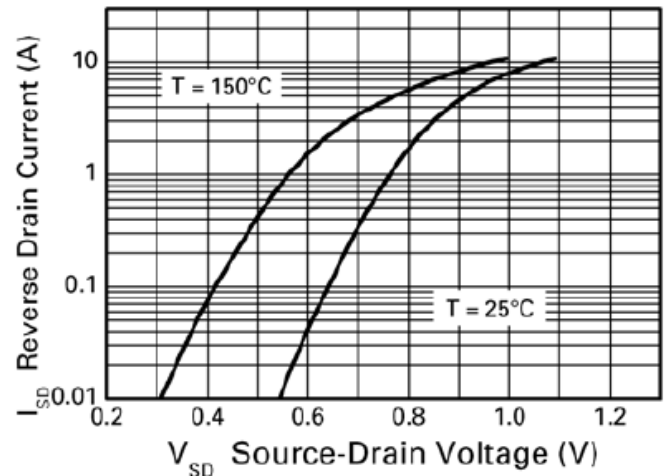
**Typical Transfer Characteristics**



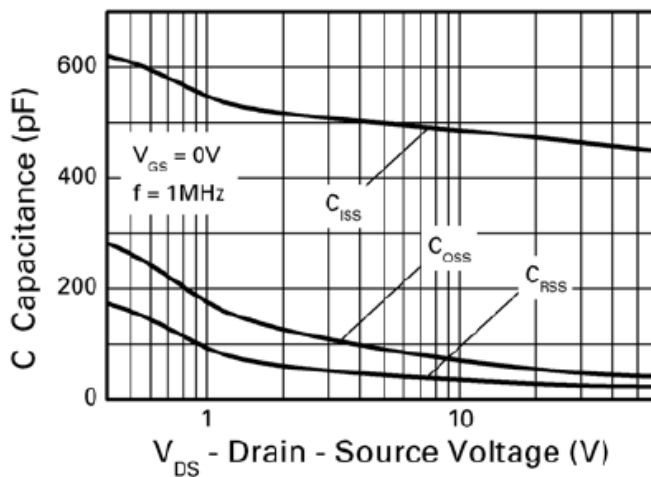
**Normalised Curves v Temperature**



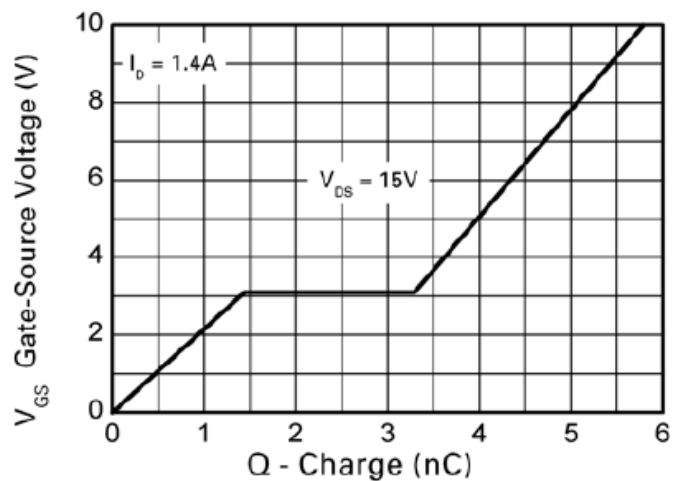
**On-Resistance v Drain Current**



**Source-Drain Diode Forward Voltage**

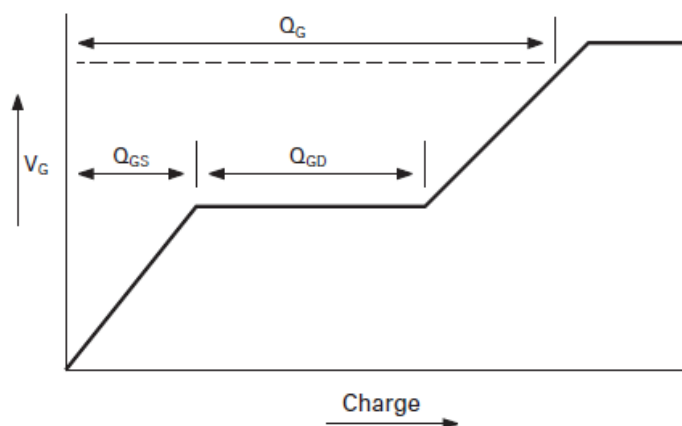


**Capacitance v Drain-Source Voltage**

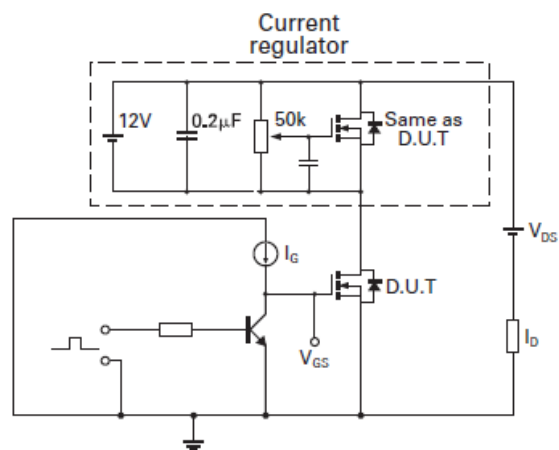


**Gate-Source Voltage v Gate Charge**

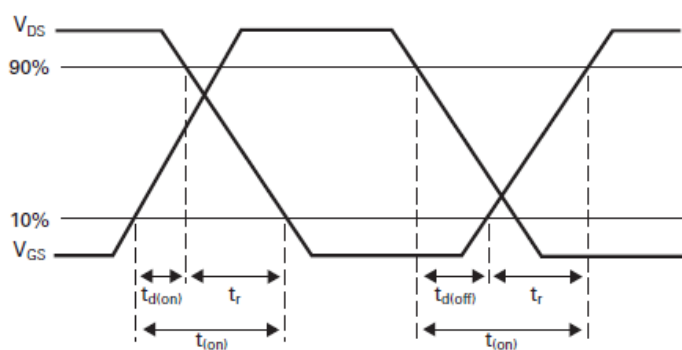
## Test Circuits



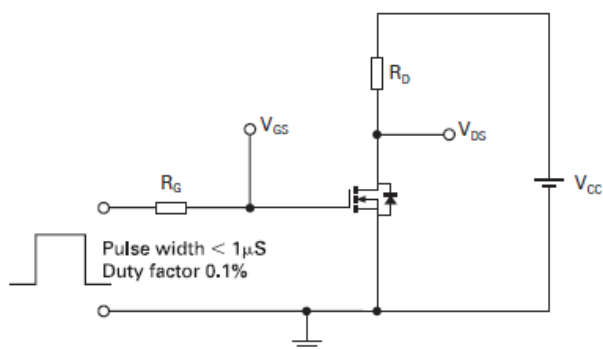
**Basic gate charge waveform**



**Gate charge test circuit**



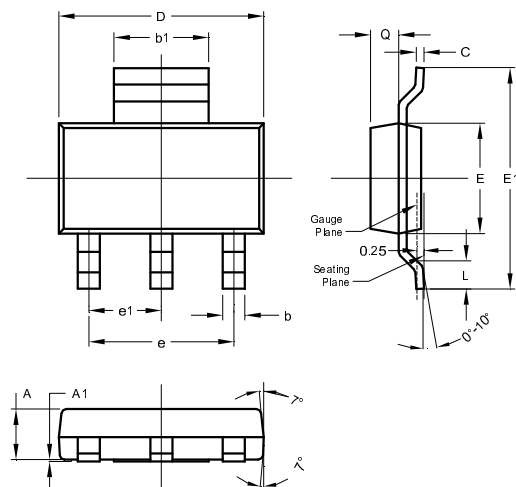
**Switching time waveforms**



**Switching time test circuit**

## Package Outline Dimensions

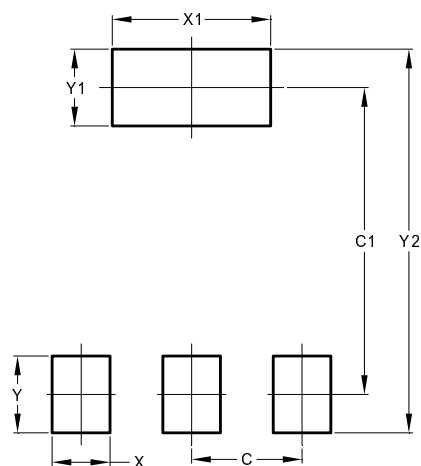
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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