

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(on)</sub> Max (Ω)	I <sub>D</sub> Max (A) T <sub>A</sub> = +25°C
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 is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- BLDC Motors
- DC-DC Converters
- Load Switch

## 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**
- **PPAP Capable (Note 4)**

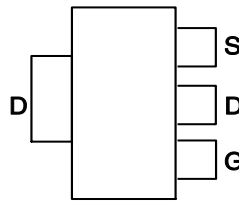
## Mechanical Data

- 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 208
- Weight: 0.112 grams (Approximate)

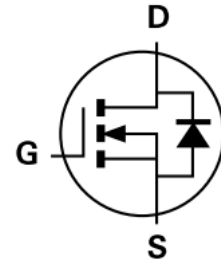
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

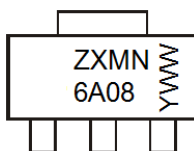
## Ordering Information (Note 5)

Part Number	Case	Packaging
ZXMN6A08GQTA	SOT223	1000/Tape & Reel
ZXMN6A08GQTC	SOT223	4000/Tape & Reel

- 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/product-compliance-definitions/>.
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information

SOT223



ZXMN6A08 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or Y = Last Digit of Year (ex: 7 = 2017)  
 WW or WW = Week Code (01 to 53)

## Absolute Maximum Ratings

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	$V_{DSS}$	60	V	
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V	
Continuous Drain Current @ $V_{GS} = 10V$	$I_D$	$T_A = +25^\circ C$ (Note 7)	5.3	A
		$T_A = +70^\circ C$ (Note 7)	4.2	A
		$T_A = +25^\circ C$ (Note 6)	3.8	A
Pulsed Drain Current (Note 8)	$I_{DM}$	20	A	
Continuous Source Current (body diode)( Note 7)	$I_S$	2.1	A	
Pulsed Source Current (body diode)( Note 8)	$I_{SM}$	20	A	
Power Dissipation at $T_A = +25^\circ C$ (Note 6)	$P_D$	2	W	
Linear Derating Factor		16	mW/ $^\circ C$	
Power Dissipation at $T_A = +25^\circ C$ (Note 7)	$P_D$	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.)

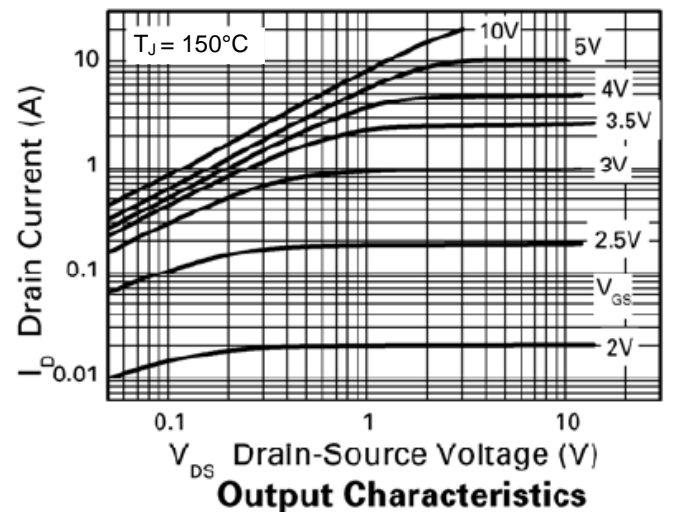
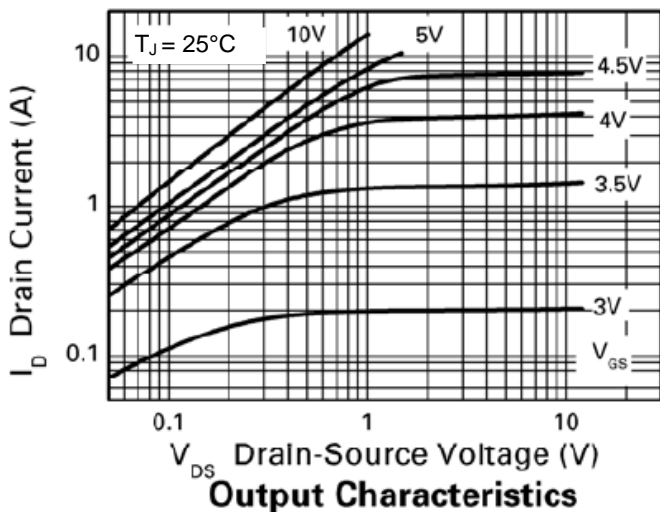
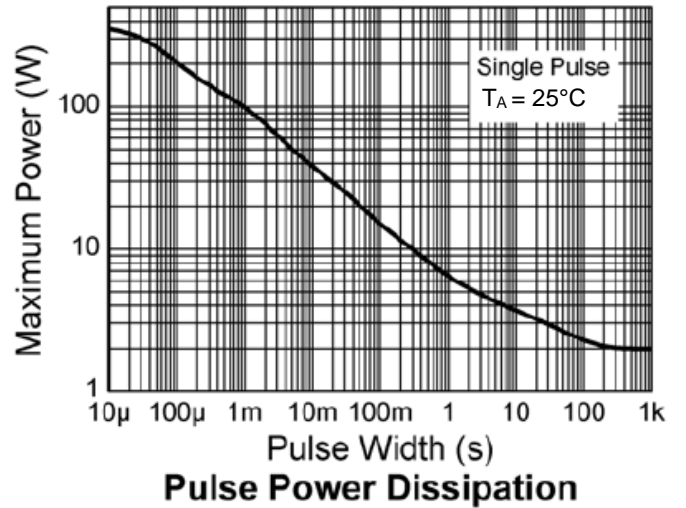
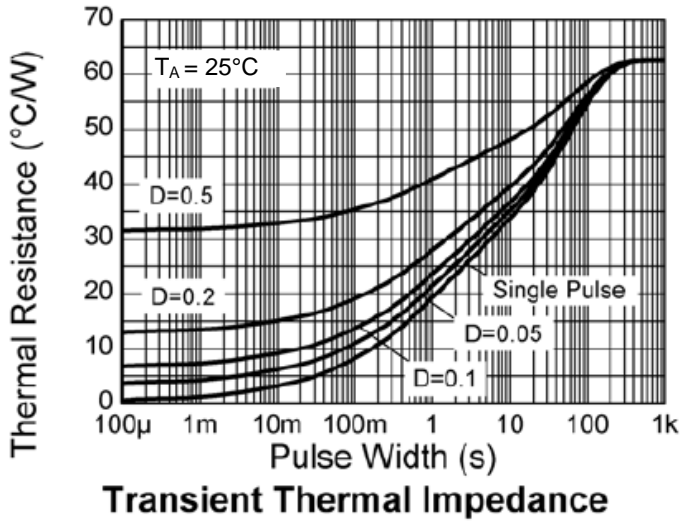
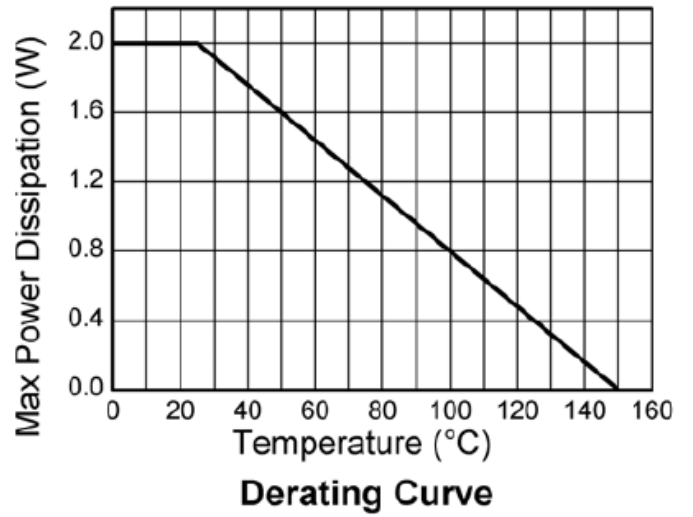
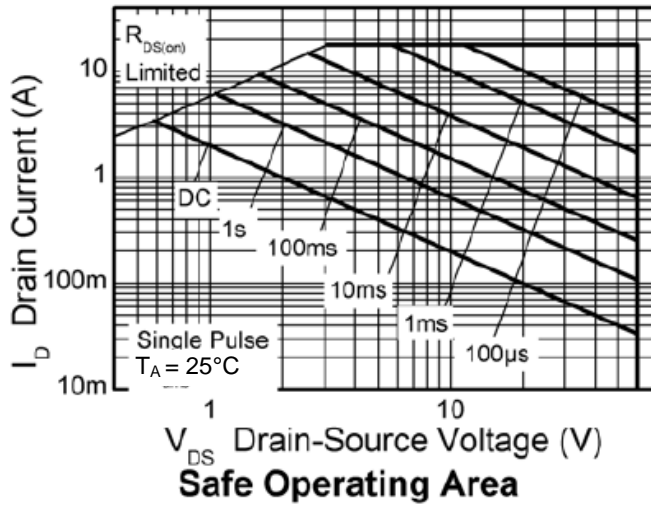
Characteristic	Symbol	Value	Units
Junction to Ambient (Note 6)	$R_{\theta JA}$	62.5	$^\circ C/W$
Junction to Ambient (Note 7)	$R_{\theta JA}$	32	$^\circ C/W$

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

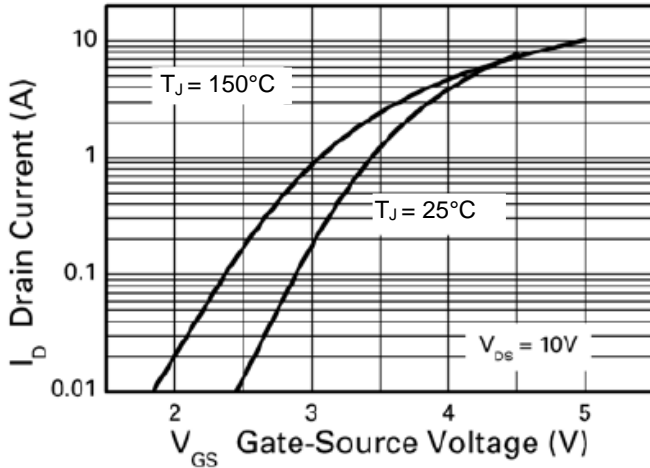
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	60	-	-	V	$V_{GS} = 0V, I_D = 250\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	-	-	0.5	$\mu A$	$V_{DS} = 60V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	-	-	100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(th)}$	1	-	-	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Static Drain-Source On-State Resistance (Note 9)	$R_{DS(on)}$	-	-	0.08	$\Omega$	$V_{GS} = 10V, I_D = 4.8A$
		-	-	0.15	$\Omega$	$V_{GS} = 4.5V, I_D = 4.2A$
Forward Transconductance (Notes 9 & 11)	$g_{fs}$	-	6.6	-	S	$V_{DS} = 15V, I_D = 4.8A$
<b>DYNAMIC CHARACTERISTICS (Note 11)</b>						
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 10)	$t_{d(on)}$	-	2.6	-	ns	$V_{DD} = 30V, I_D = 1.5A$ $R_G \cong 6.0\Omega, V_{GS} = 10V$
Turn-On Rise Time (Note 10)	$t_r$	-	2.1	-	ns	
Turn-Off Delay Time (Note 10)	$t_{d(off)}$	-	12.3	-	ns	
Turn-Off Fall Time (Note 10)	$t_f$	-	4.6	-	ns	
Gate Charge (Note 10)	$Q_G$	-	4.0	-	nC	$V_{DS} = 30V, V_{GS} = 5V$ $I_D = 1.4A$
Total Gate Charge (Note 10)	$Q_G$	-	5.8	-	nC	$V_{DS} = 30V, V_{GS} = 10V$ $I_D = 1.4A$
Gate-Source Charge (Note 10)	$Q_{GS}$	-	1.4	-	nC	
Gate Drain Charge (Note 10)	$Q_{GD}$	-	1.9	-	nC	
<b>SOURCE-DRAIN DIODE</b>						
Diode Forward Voltage (Note 9)	$V_{SD}$	-	0.88	1.2	V	$T_J = +25^\circ C, I_S = 4A,$ $V_{GS} = 0V$
Reverse Recovery Time (Note 11)	$t_{rr}$	-	19.2	-	ns	$T_J = +25^\circ C, I_S = 1.4A,$
Reverse Recovery Charge (Note 11)	$Q_{rr}$	-	30.3	-	nC	$di/dt = 100A/\mu s$

- Notes:
- For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  - For a device surface mounted on FR-4 PCB measured at  $t <= 10s$ .
  - Repetitive rating - 25mm x 25mm FR-4 PCB,  $D=0.02$ , pulse width 300\_s - pulse width limited by maximum junction temperature.
  - Measured under pulsed conditions. Pulse width  $<= 300s$ ; duty cycle  $<= 2\%$ .
  - Switching characteristics are independent of operating junction temperature.
  - For design aid only, not subject to production testing.

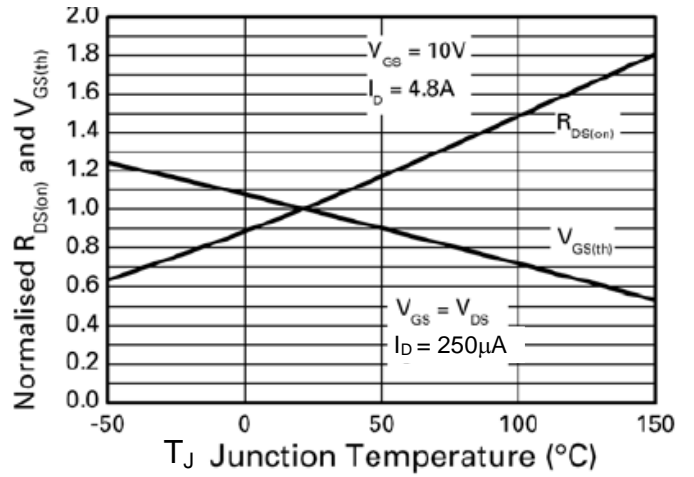
**Typical Characteristics**



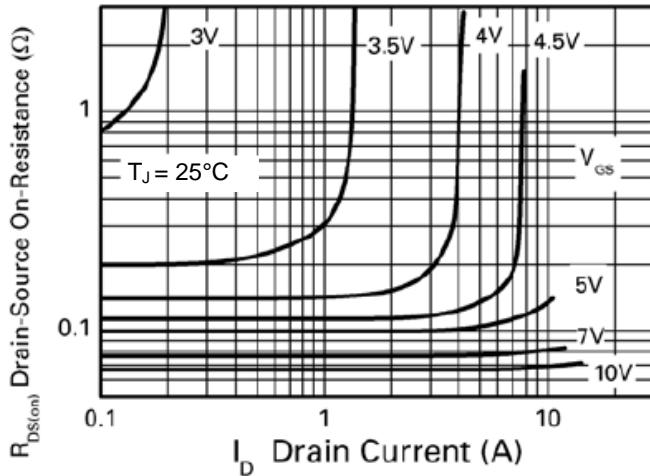
**Typical Characteristics (Cont.)**



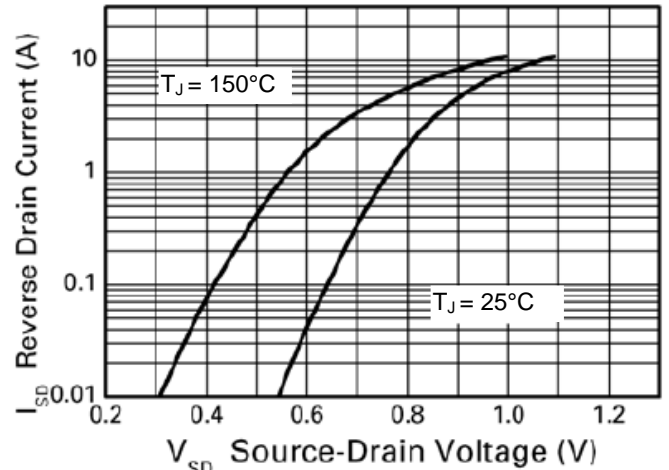
**Typical Transfer Characteristics**



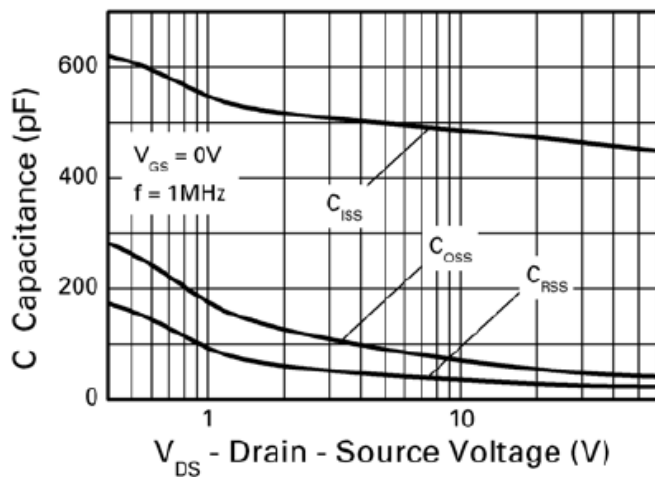
**Normalised Curves v Temperature**



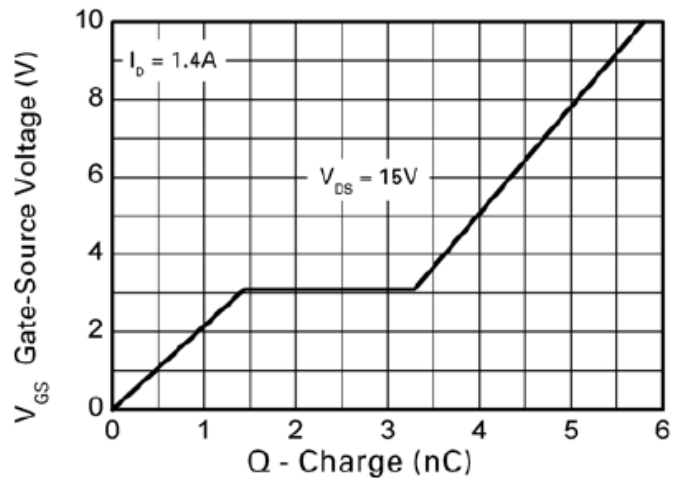
**On-Resistance v Drain Current**



**Source-Drain Diode Forward Voltage**

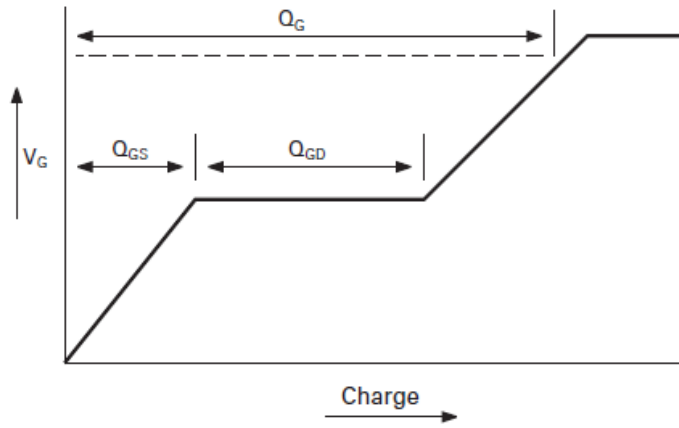


**Capacitance v Drain-Source Voltage**

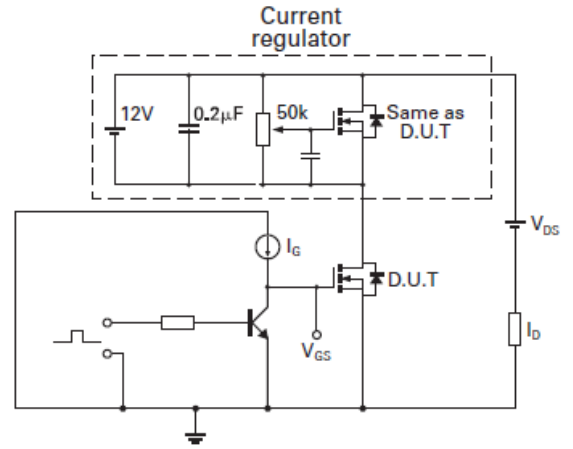


**Gate-Source Voltage v Gate Charge**

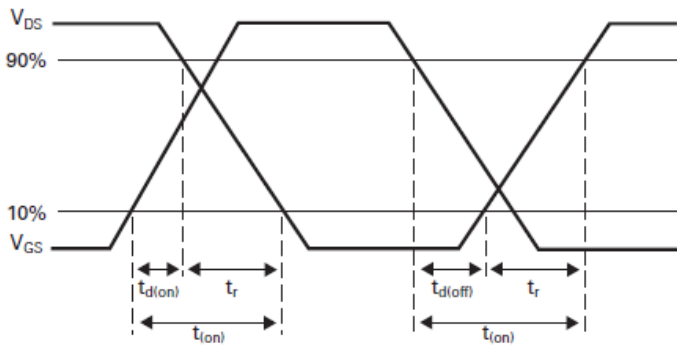
**Test Circuits**



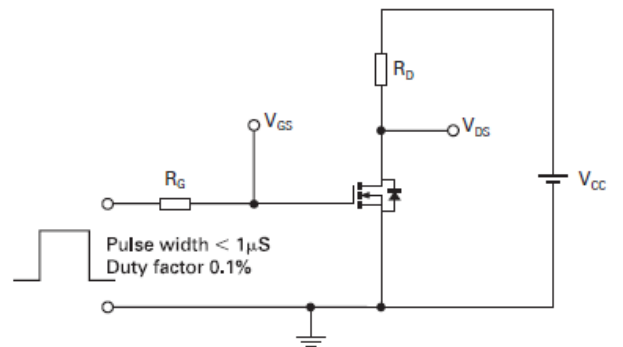
**Basic gate charge waveform**



**Gate charge test circuit**



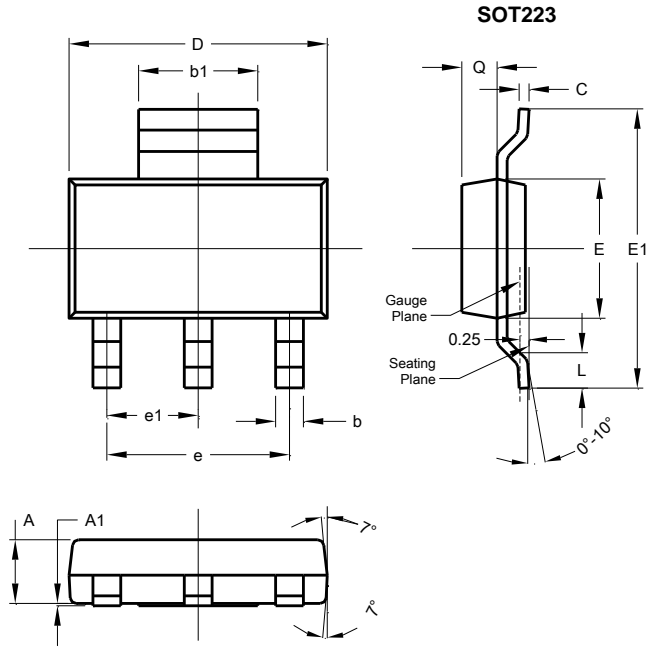
**Switching time waveforms**



**Switching time test circuit**

**Package Outline Dimensions**

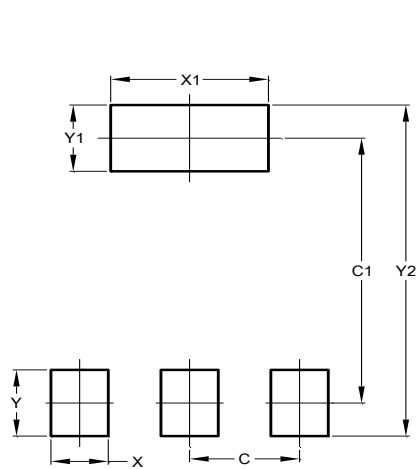
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



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 <http://www.diodes.com/package-outlines.html> 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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