60V SOT223 N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(on)}$ Max (Ω)	I_D Max (A) T_A = +25°C
60V	0.08 @ V_{GS} = 10V	5.3
	0.15 @ V_{GS} = 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

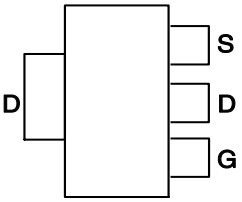
- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

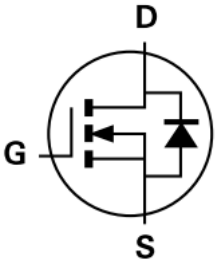
- Case: SOT223
- Case Material: Molded Plastic.
  UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.112 grams (Approximate)

SOT223

Top View



Pin Out - Top View



Equivalent Circuit

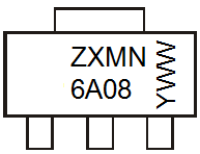
Ordering Information (Note 5)

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 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}	±20	V
Continuous Drain Current @ V_{GS} = 10V	T_A = +25°C (Note 7)	I_D	5.3	A
	T_A = +70°C (Note 7)		4.2	A
	T_A = +25°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°C (Note 6) Linear Derating Factor		P_D	2 16	W mW/°C
Power Dissipation at T_A = +25°C (Note 7) Linear Derating Factor		P_D	3.9 31	W mW/°C
Linear Derating Factor		T_J, T_{STG}	-55 to +150	°C

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

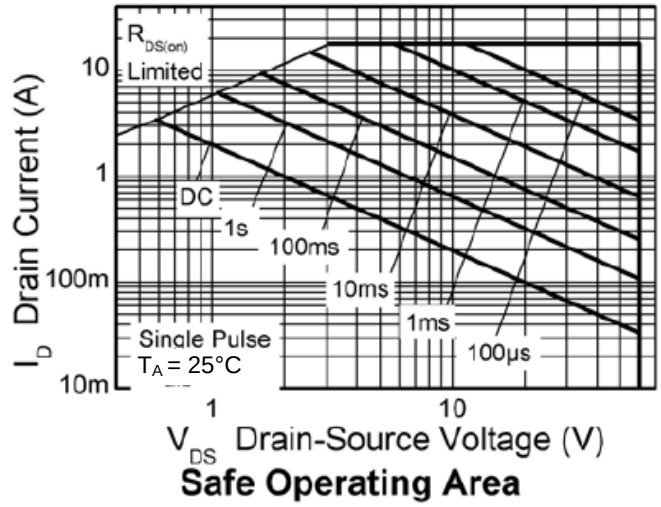
Characteristic	Symbol	Value	Units
Junction to Ambient (Note 6)	$R_{\theta JA}$	62.5	°C/W
Junction to Ambient (Note 7)	$R_{\theta JA}$	32	°C/W

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

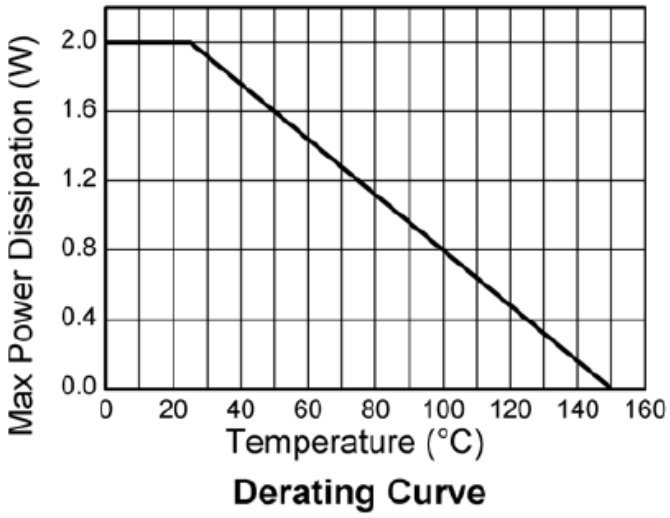
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	60	–	–	V	V_{GS} = 0V, I_D =250µA
Zero Gate Voltage Drain Current	I_{DSS}	–	–	0.5	µA	V_{DS} = 60V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	–	–	100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	1	–	-	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-State Resistance (Note 9)	$R_{DS(on)}$	–	–	0.08	Ω	V_{GS} = 10V, I_D = 4.8A
		–	–	0.15	Ω	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
DYNAMIC CHARACTERISTICS (Note 11)						
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 ≅ 6.0Ω, 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	
SOURCE-DRAIN DIODE						
Diode Forward Voltage (Note 9)	V_{SD}	–	0.88	1.2	V	T_J=+25°C, I_S= 4A, V_{GS}=0V
Reverse Recovery Time (Note 11)	trr	–	19.2	–	ns	T_J=+25°C, I_S= 1.4A, di/dt=100A/µs
Reverse Recovery Charge (Note 11)	Qrr	–	30.3	–	nC	

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

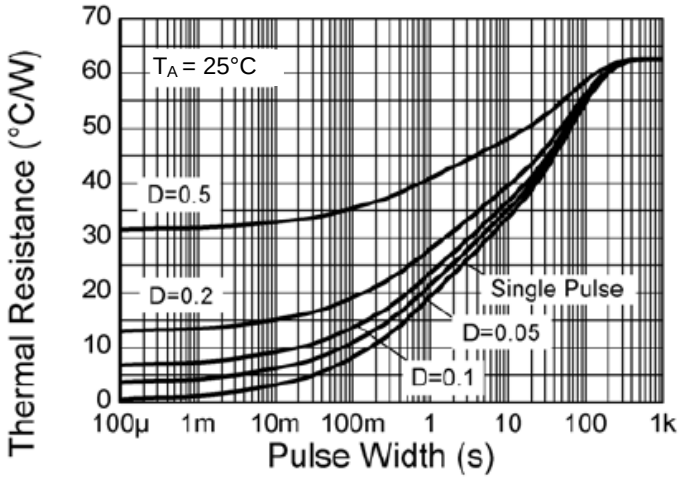
Typical Characteristics



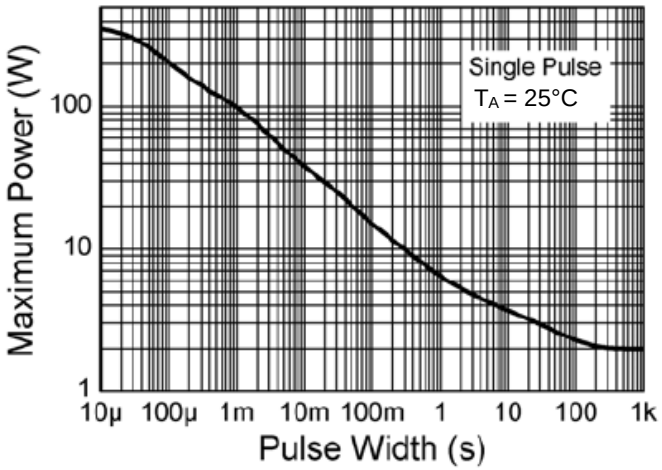
Safe Operating Area



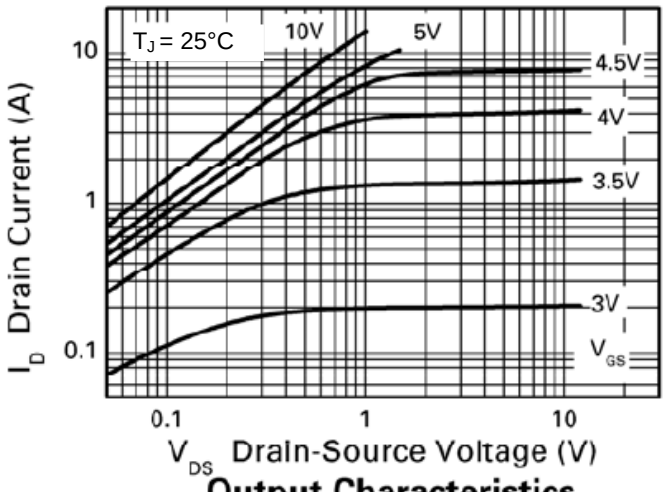
Derating Curve



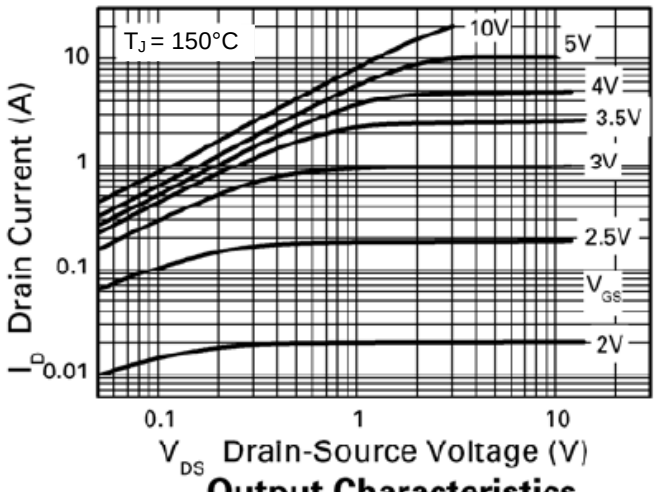
Transient Thermal Impedance



Pulse Power Dissipation

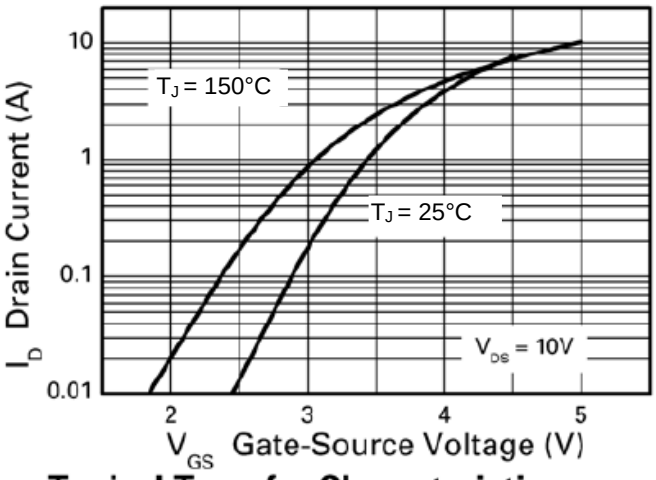


Output Characteristics

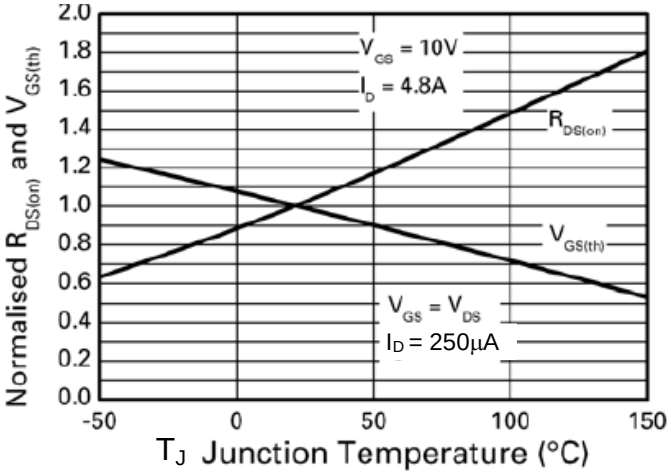


Output Characteristics

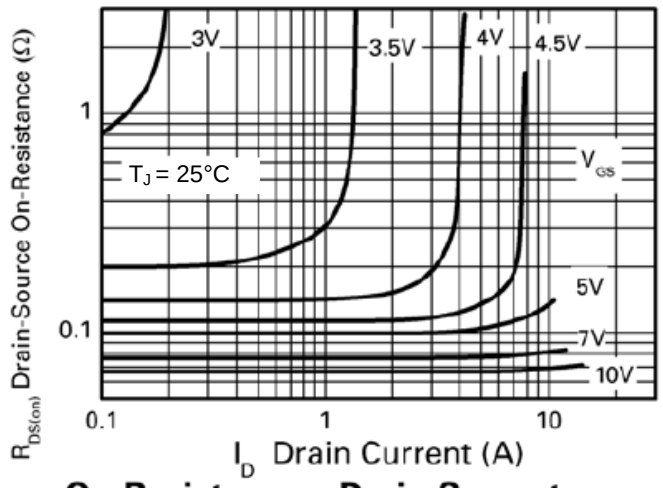
Typical Characteristics (Cont.)



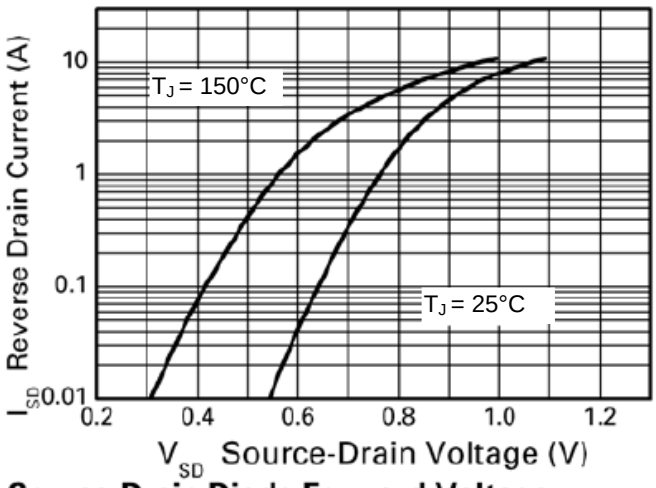
Typical Transfer Characteristics



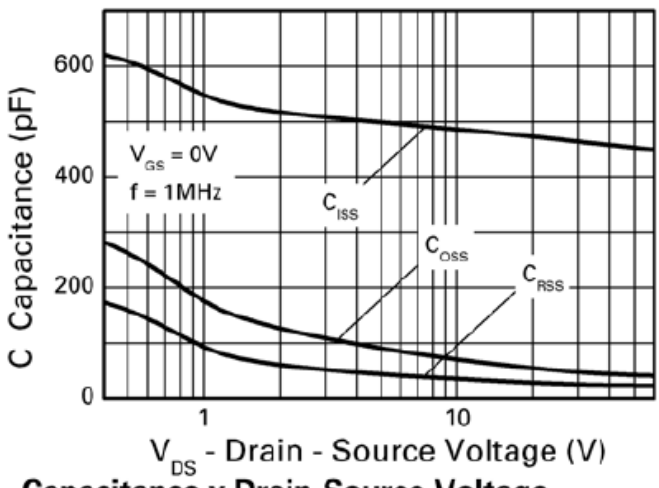
Normalised Curves v Temperature



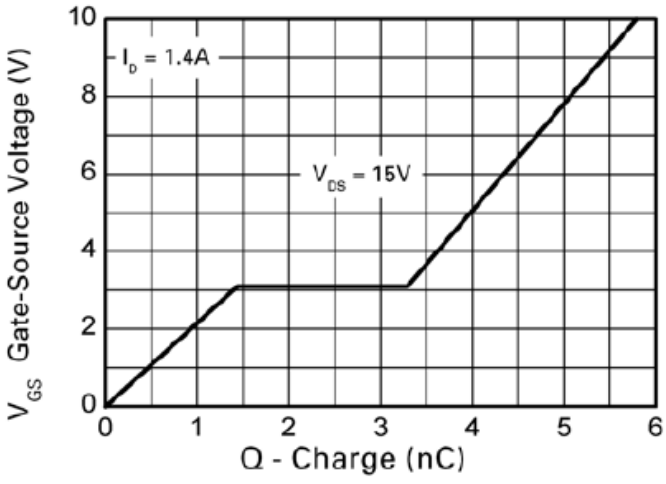
On-Resistance v Drain Current



Source-Drain Diode Forward Voltage

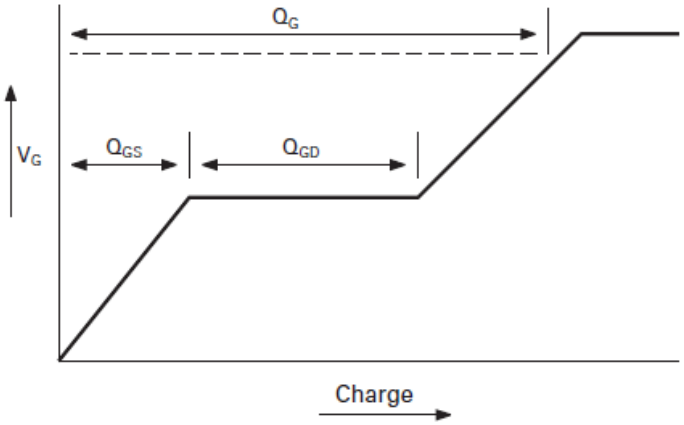


Capacitance v Drain-Source Voltage

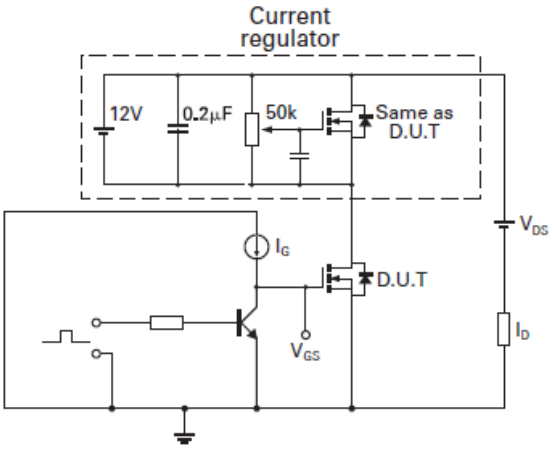


Gate-Source Voltage v Gate Charge

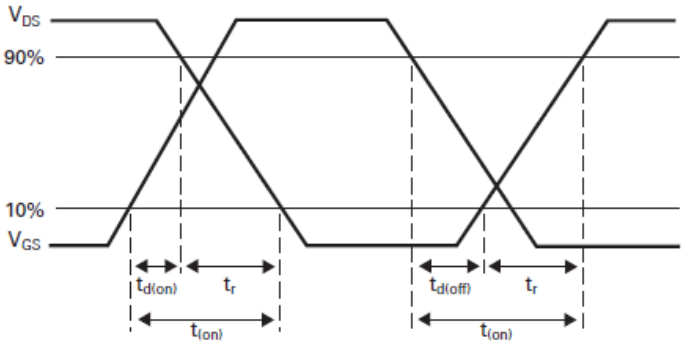
Test Circuits



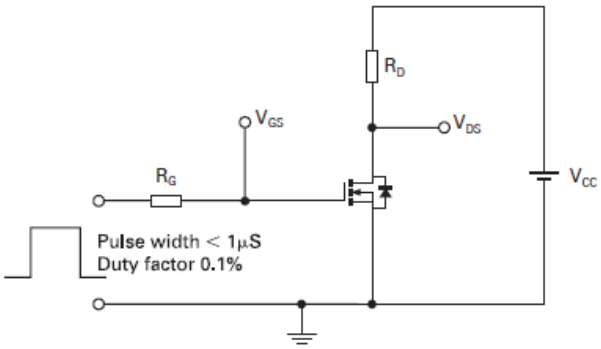
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms

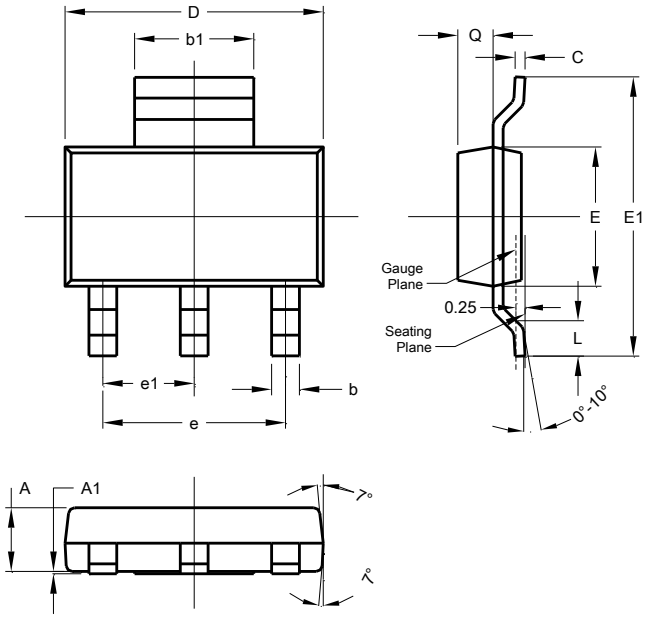


Switching time test circuit

Package Outline Dimensions

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

SOT223

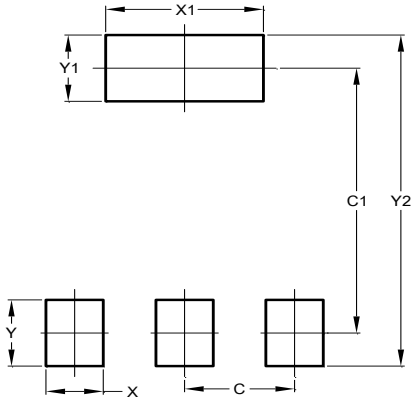


SOT223			
Dim	**Min**	**Max**	**Typ**
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

Suggested Pad Layout

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

SOT223



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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