60V SOT223 N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
60V	0.08Ω @ V_{GS} = 10V	5.3A
	0.15Ω @ V_{GS} = 4.5V	2.8A

Features and Benefits

- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The ZXMN6A08GQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

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 switches

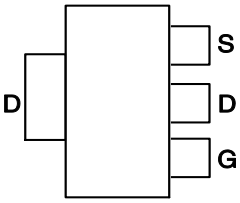
Mechanical Data

- Package: SOT223
- Package 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)

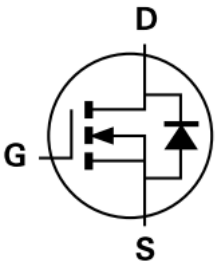
SOT223 (Type DN)



Top View



Pinout - Top View



Equivalent Circuit

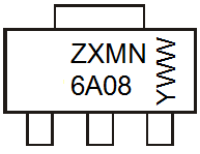
Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
ZXMN6A08GQTA	SOT223 (Type DN)	1000	Tape & Reel
ZXMN6A08GQTC	SOT223 (Type DN)	4000	Tape & Reel

Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
2. See https://www.diodes.com/quality/lead-free/ 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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

SOT223 (Type DN)



ZXMN6A08 = Product Type Marking Code
YWW = Date Code Marking
Y = Last Digit of Year (ex: 5 = 2025)
WW = Week Code (01 to 53)

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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 5)	I_D	5.3	A
	T_A = +70°C (Note 5)		4.2	A
	T_A = +25°C (Note 6)		3.8	A
Pulsed Drain Current (Note 7)		I_{DM}	20	A
Continuous Source Current (Body Diode) (Note 5)		I_S	2.1	A
Pulsed Source Current (Body Diode) (Note 7)		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 5) Linear Derating Factor		P_D	3.9 31	W mW/°C
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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

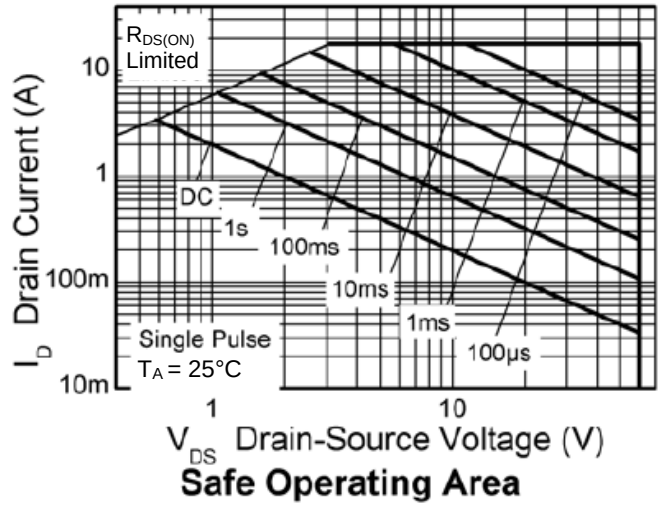
Characteristic	Symbol	Value	Unit
Junction to Ambient (Note 6)	$R_{\theta JA}$	62.5	°C/W
Junction to Ambient (Note 5)	$R_{\theta JA}$	32	°C/W

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

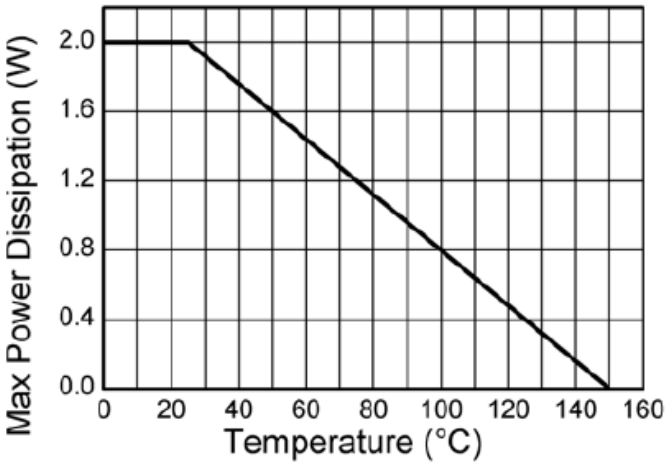
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	0.5	µA	V_{DS} = 60V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	—	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	—	0.06	0.08	Ω	V_{GS} = 10V, I_D = 4.8A
		—	0.08	0.15	Ω	V_{GS} = 4.5V, I_D = 4.2A
Forward Transconductance (Note 8)	g_{fs}	—	6.6	—	S	V_{DS} = 15V, I_D = 4.8A
Diode Forward Voltage	V_{SD}	—	0.88	1.2	V	T_J = +25°C, I_S = 4A V_{GS} = 0V
DYNAMIC CHARACTERISTICS (Note 8)						
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 R_G ≅ 6.0Ω, 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						
Reverse-Recovery Time (Note 8)	t_{RR}	—	19.2	—	ns	T_J = +25°C, I_S = 1.4A di/dt = 100A/µs
Reverse-Recovery Charge (Note 8)	Q_{RR}	—	30.3	—	nC	

Notes:
5. For a device surface-mounted on FR-4 PCB measured at t ≤ 10s.
6. For a device surface-mounted on 25mm × 25mm FR-4 PCB with high coverage of single-sided 1oz copper, in still air conditions.
7. Repetitive rating - 25mm × 25mm FR-4 PCB, D = 0.02, pulse width 300µs - pulse width limited by maximum junction temperature.
8. For design aid only, not subject to production testing.
9. Switching characteristics are independent of operating junction temperature.

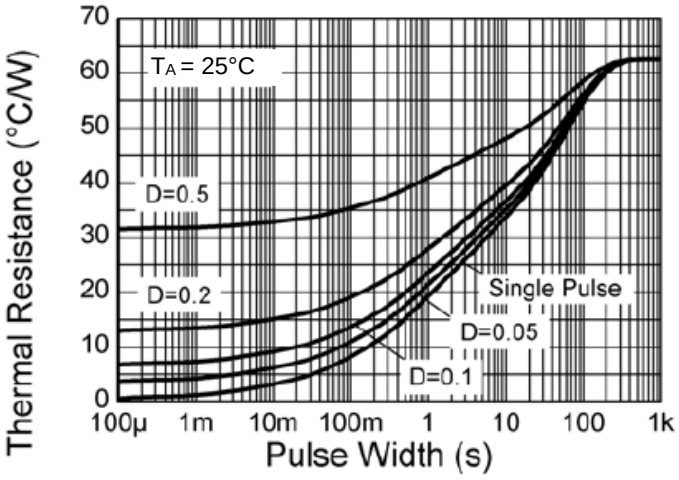
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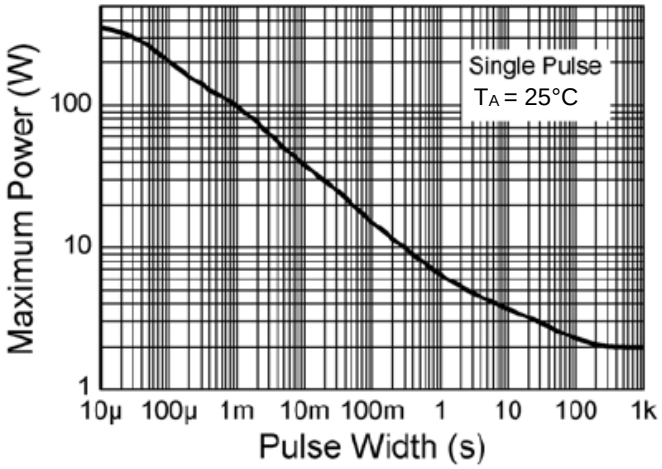
Safe Operating Area



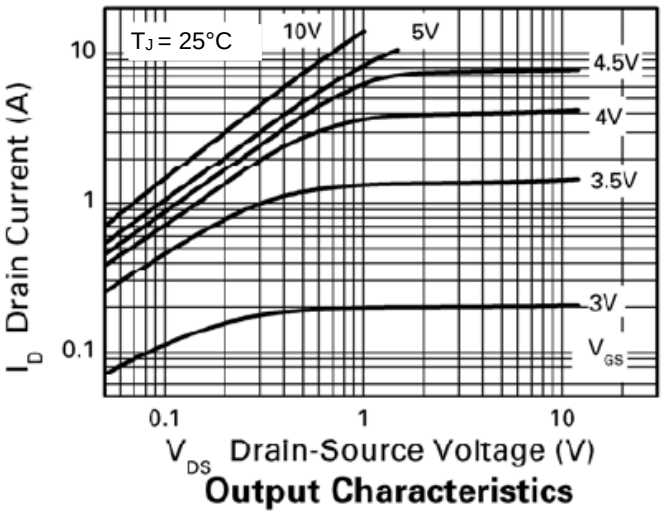
Derating Curve



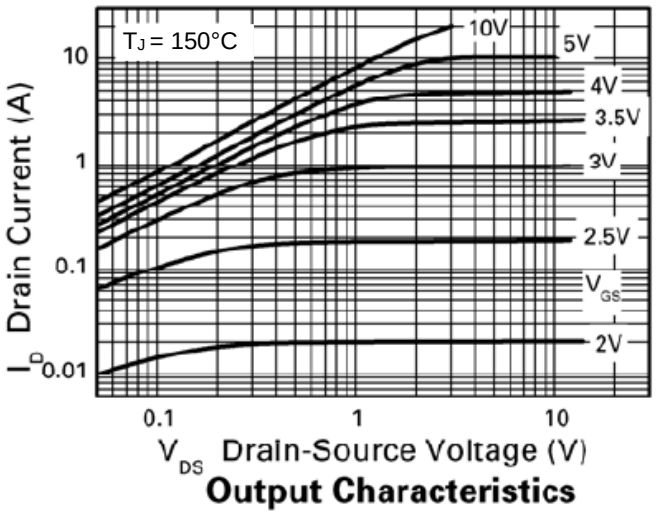
Transient Thermal Impedance



Pulse Power Dissipation

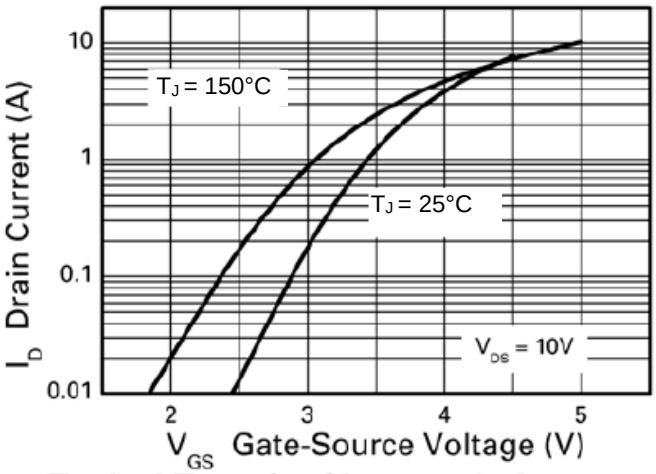


Output Characteristics

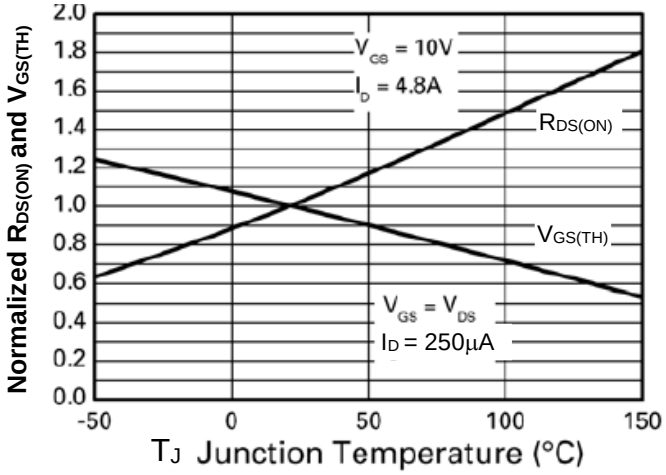


Output Characteristics

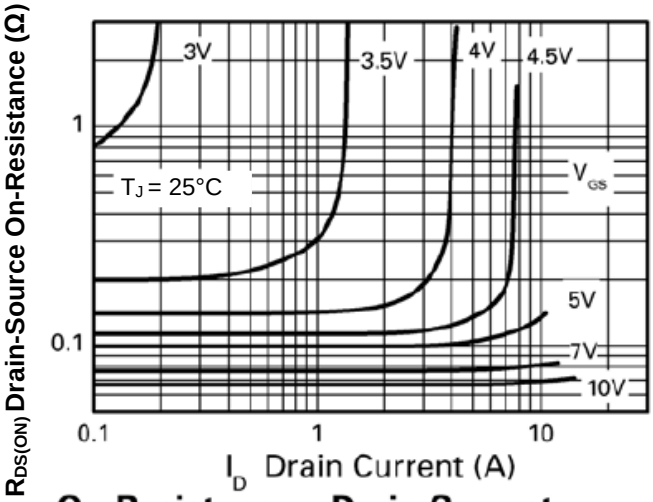
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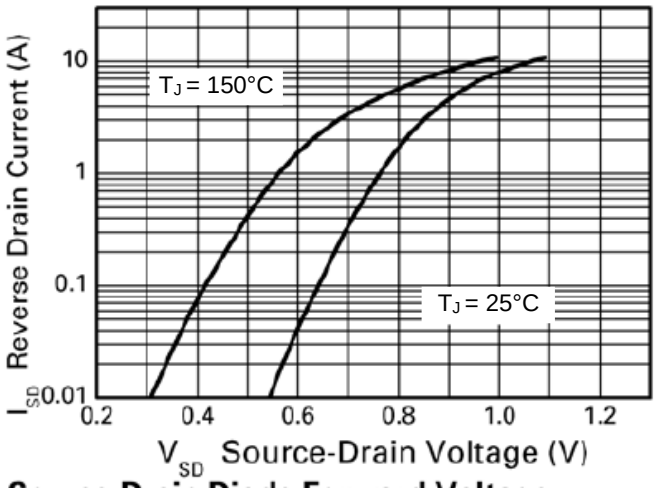
Typical Transfer Characteristics



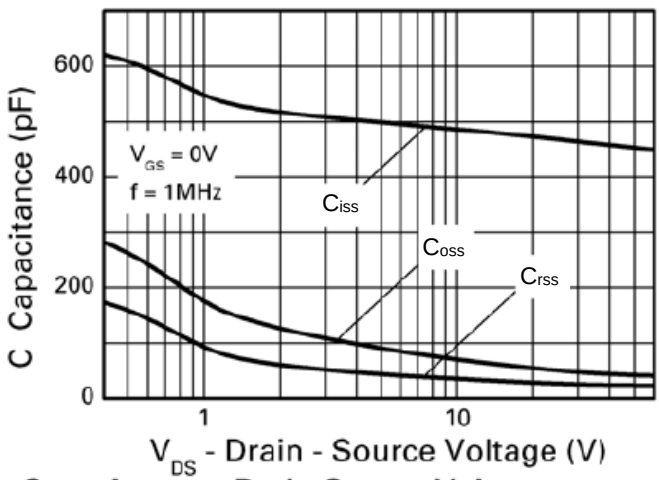
Normalised Curves v Temperature



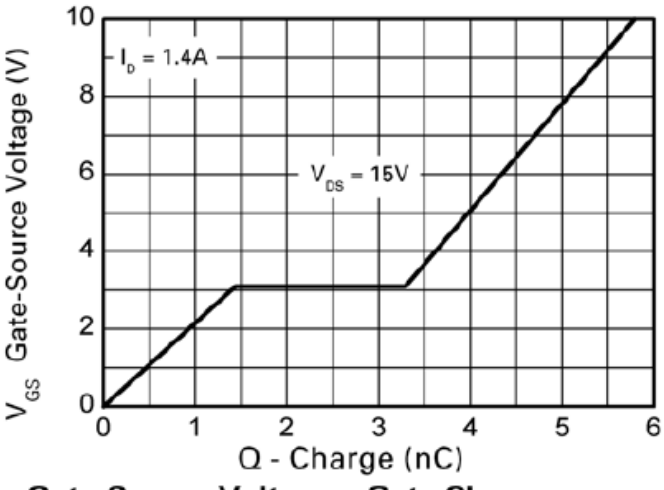
On-Resistance v Drain Current



Source-Drain Diode Forward Voltage



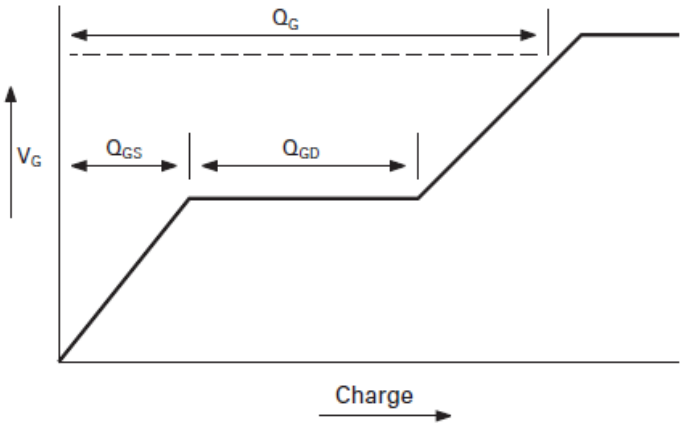
Capacitance v Drain-Source Voltage



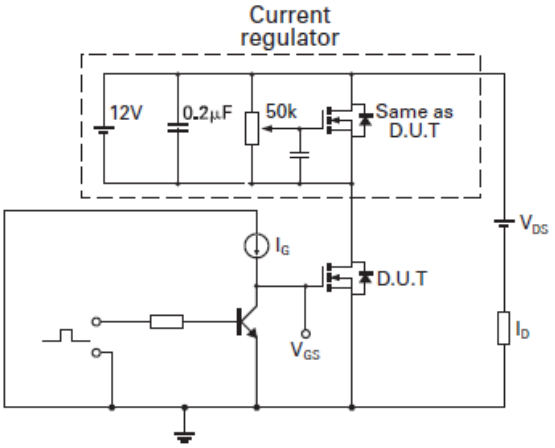
Gate-Source Voltage v Gate Charge

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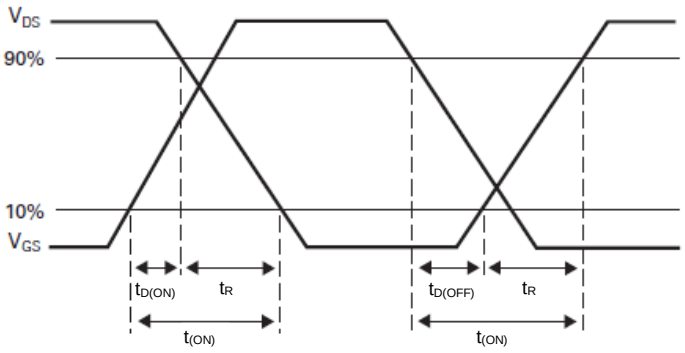
Test Circuits



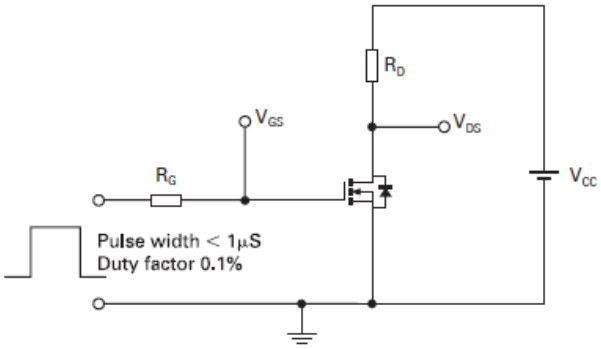
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



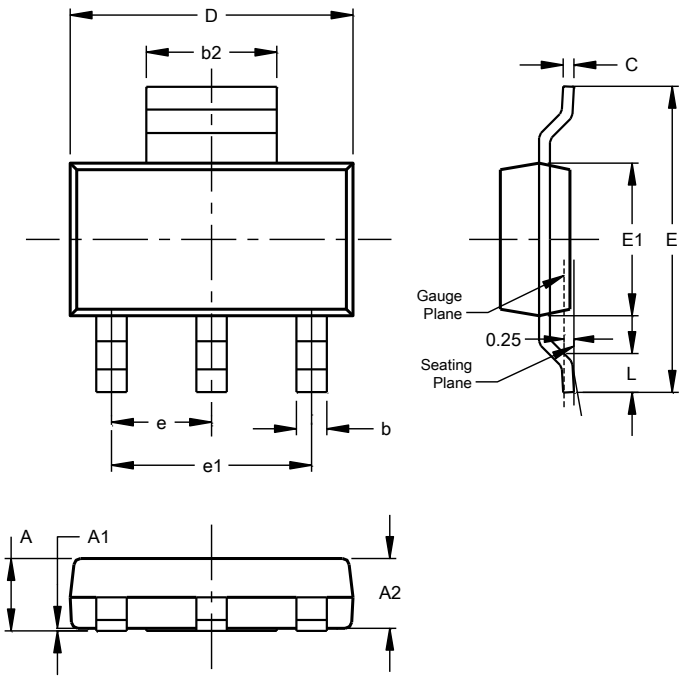
Switching time test circuit

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Package Outline Dimensions

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

SOT223 (Type DN)

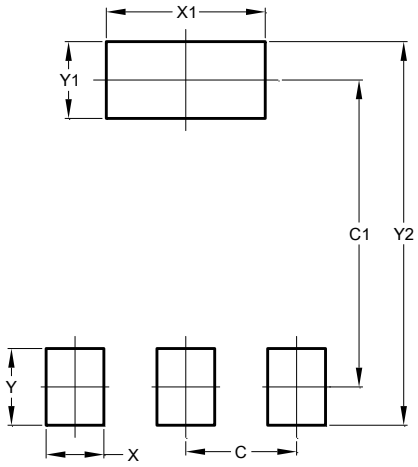


SOT223 (Type DN)			
Dim	**Min**	**Max**	**Typ**
A	--	1.70	--
A1	0.01	0.15	--
A2	1.50	1.68	1.60
b	0.60	0.80	0.70
b2	2.90	3.10	--
c	0.20	0.32	--
D	6.30	6.70	--
E	6.70	7.30	--
E1	3.30	3.70	--
e	--	--	2.30
e1	--	--	4.60
L	0.85	--	--
All Dimensions in mm			

Suggested Pad Layout

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

SOT223 (Type DN)



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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