

Product Summary

BV _{DSS}	R _{DS(on)}	I _D T _A = +25°C
60V	0.04Ω @ V _{GS} = 10V	7.5A
	0.06Ω @ V _{GS} = 4.5V	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

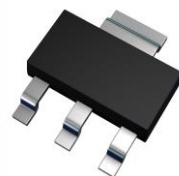
Features and Benefits

- 100% Unclamped Inductive Switch (UIS) Test in Production
- 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)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.**
<https://www.diodes.com/quality/product-definitions/>

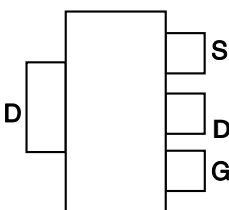
Mechanical Data

- Package: SOT223 (Type DN)
- Package Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 Ⓔ
- Weight: 0.112 grams (Approximate)

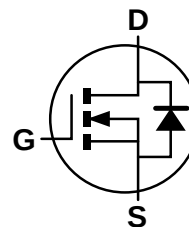
SOT223 (Type DN)



Top View



Pin Out - Top View



Equivalent Circuit

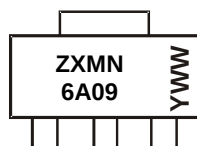
Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
ZXMN6A09GTA	SOT223 (Type DN)	1,000	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)



ZXMN6A09 = Product Type Marking Code

YWW = Date Code Marking

Y = Last Digit of Year (ex: 2 = 2022)

WW = Week Code (01 to 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

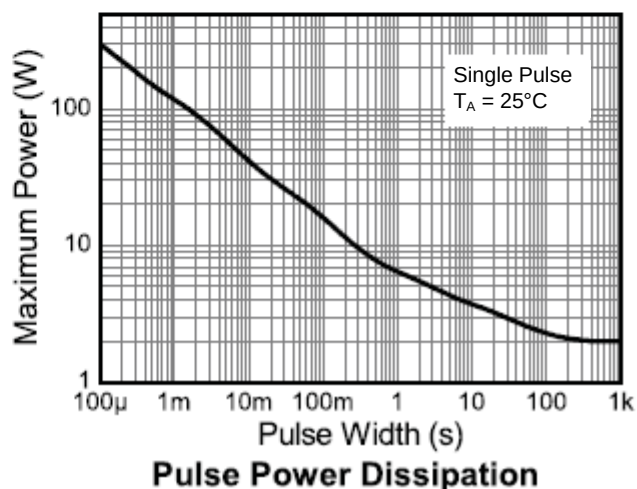
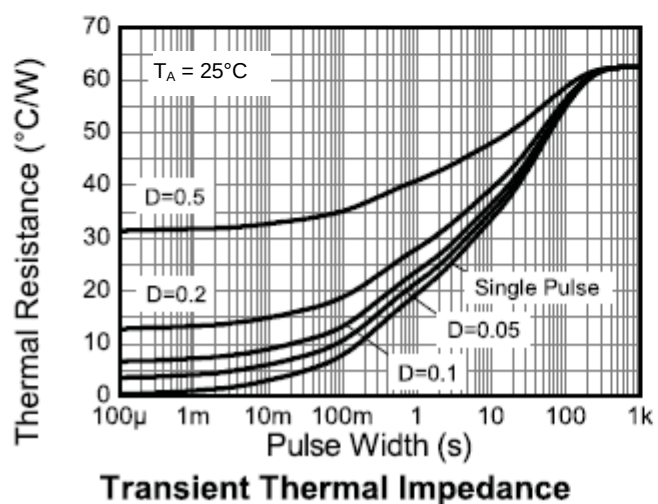
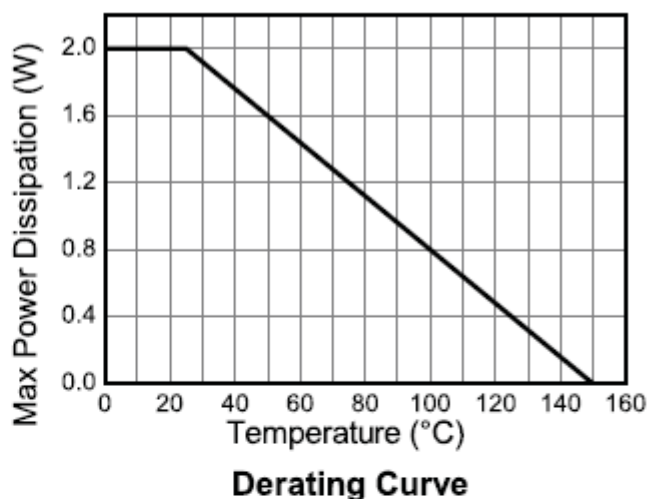
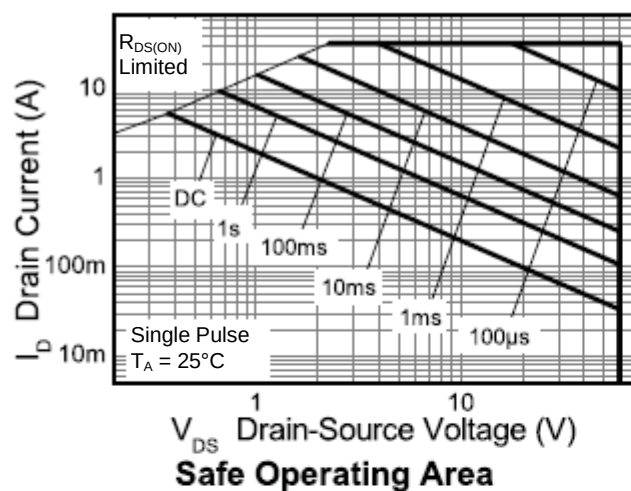
Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	60	V
Gate-Source Voltage	V _{GSS}	±20	V
Continuous Drain Current @V _{GS} = 10V; T _A = +25°C (Note 6)	I _D	7.5	A
@V _{GS} = 10V; T _A = +70°C (Note 6)		6	
@V _{GS} = 10V; T _A = +25°C (Note 5)		5.4	
Pulsed Drain Current (Note 7)	I _{DM}	33	A
Continuous Source Current (Body Diode) (Note 6)	I _S	3.5	A
Pulsed Source Current (Body Diode) (Note 7)	I _{SM}	33	A
Avalanche Current, L = 0.1mH	I _{AS}	1.17	A
Avalanche Energy, L = 0.1mH	E _{AS}	0.07	mJ

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

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

Notes:

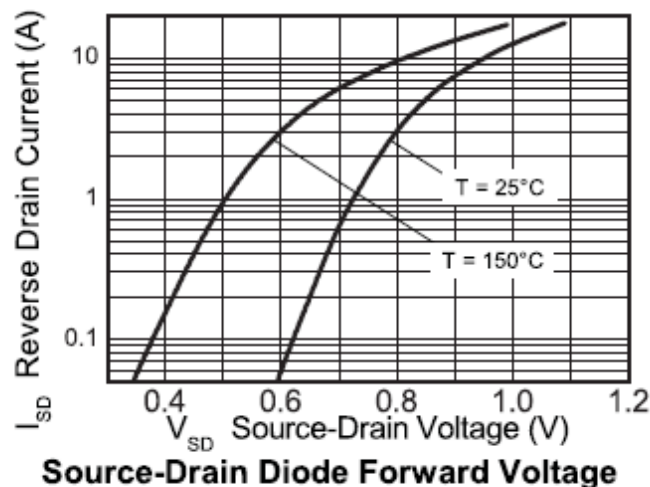
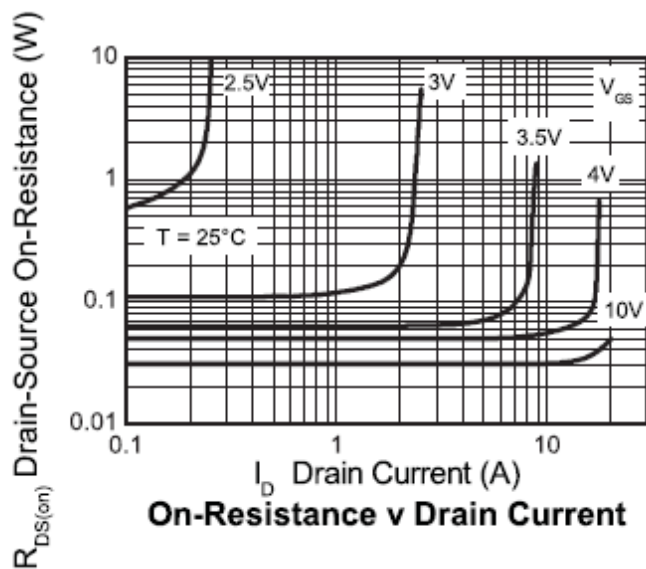
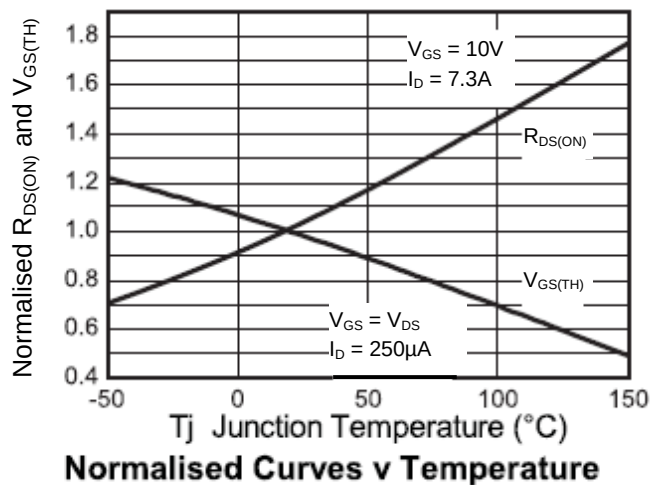
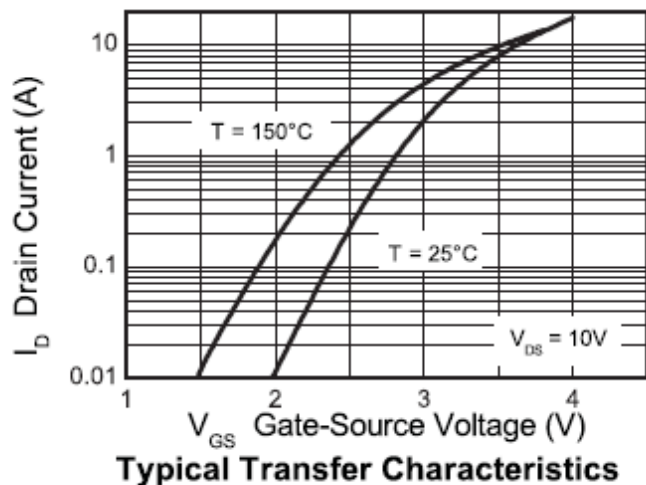
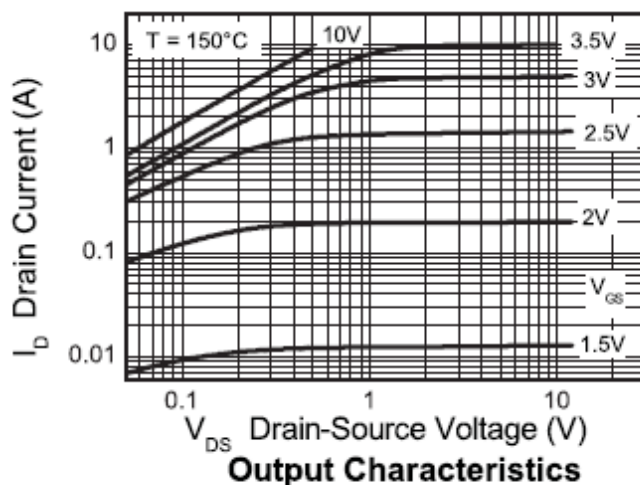
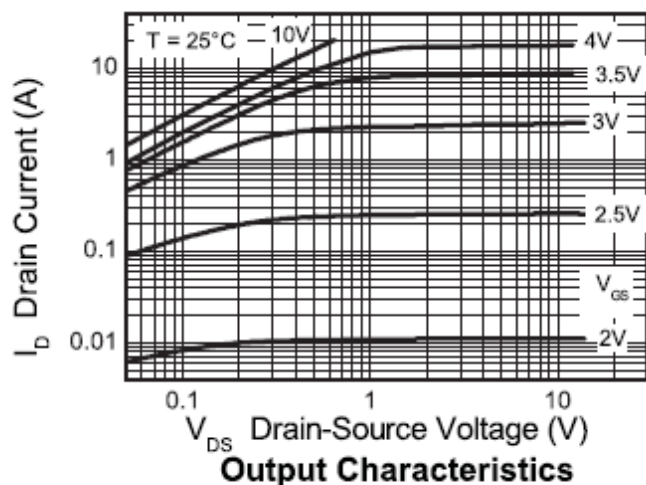
- For a device surface mounted on 25mm × 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
- For a device surface mounted on FR-4 PCB measured at t ≤ 10s.
- Repetitive rating 25mm × 25mm FR-4 PCB, D = 0.02 pulse width = 300μs - pulse width limited by maximum junction temperature.

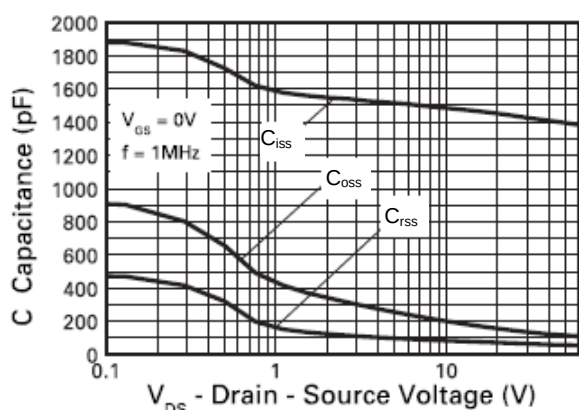


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

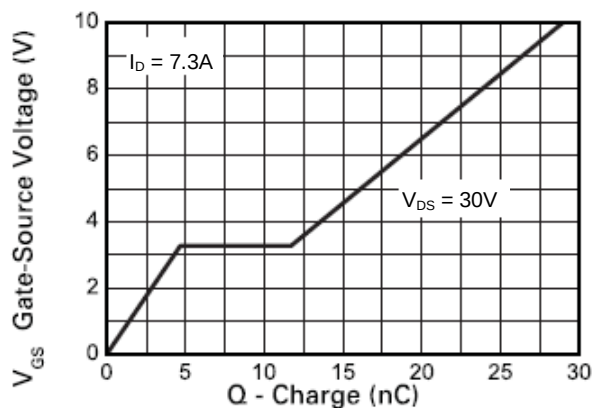
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	1	—	3	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance (Note 8)	R _{DS(ON)}	—	0.02	0.04	Ω	V _{GS} = 10V, I _D = 8.2A
		—	0.03	0.06	Ω	V _{GS} = 4.5V, I _D = 7.4A
Diode Forward Voltage (Note 8)	V _{SD}	—	0.85	0.95	V	I _S = 6.6A, V _{GS} = 0V, T _J = +25°C
DYNAMIC CHARACTERISTICS						
Input Capacitance (Note 10)	C _{iss}	—	1407	—	pF	V _{DS} = 40V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance (Note 10)	C _{oss}	—	121	—	pF	
Reverse Transfer Capacitance (Note 10)	C _{rss}	—	59	—	pF	
Total Gate Charge (Notes 9 & 10) V _{GS} = 5V	Q _g	—	12.4	—	nC	V _{DS} = 15V I _D = 3.5A
Total Gate Charge (Notes 9 & 10) V _{GS} = 10V	Q _g	—	24.2	—	nC	
Gate-Source Charge (Notes 9 & 10)	Q _{gs}	—	5.2	—	nC	
Gate-Drain Charge (Notes 9 & 10)	Q _{gd}	—	3.5	—	nC	
Turn-On Delay Time (Notes 9 & 10)	t _{D(ON)}	—	4.9	—	ns	V _{DD} = 15V, I _D = 3.5A, V _{GS} = 5V
Turn-On Rise Time (Note 9 & 10)	t _r	—	5.0	—	ns	
Turn-Off Delay Time (Notes 9 & 10)	t _{D(OFF)}	—	25.3	—	ns	
Turn-Off Fall Time (Notes 9 & 10)	t _f	—	4.6	—	ns	
Reverse Recovery Time (Note 10)	t _{RR}	—	26.3	—	ns	I _F = 3.5A, di/dt = 100A/μs, T _J = +25°C
Reverse Recovery Charge (Note 10)	Q _{RR}	—	26.6	—	nC	

Notes: 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.

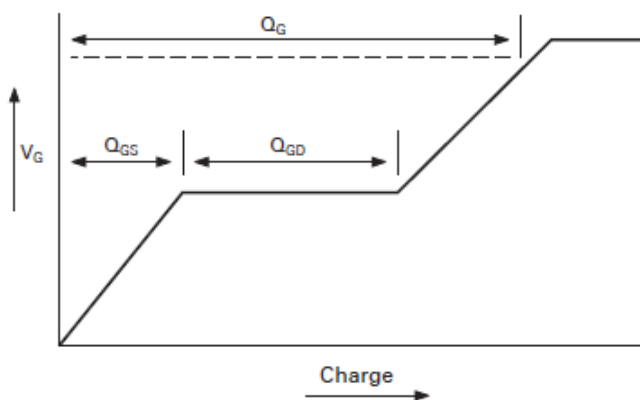




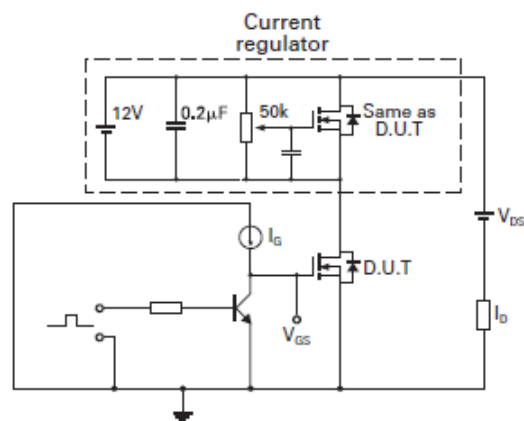
Capacitance v Drain-Source Voltage



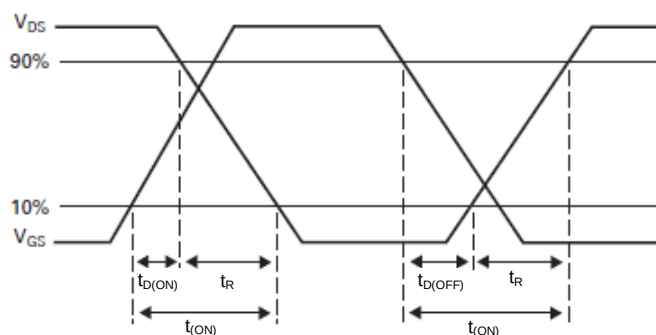
Gate-Source Voltage v Gate Charge



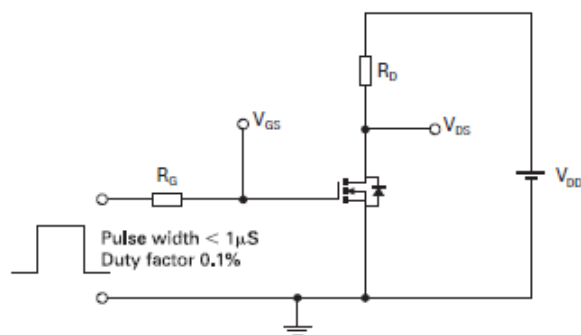
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms

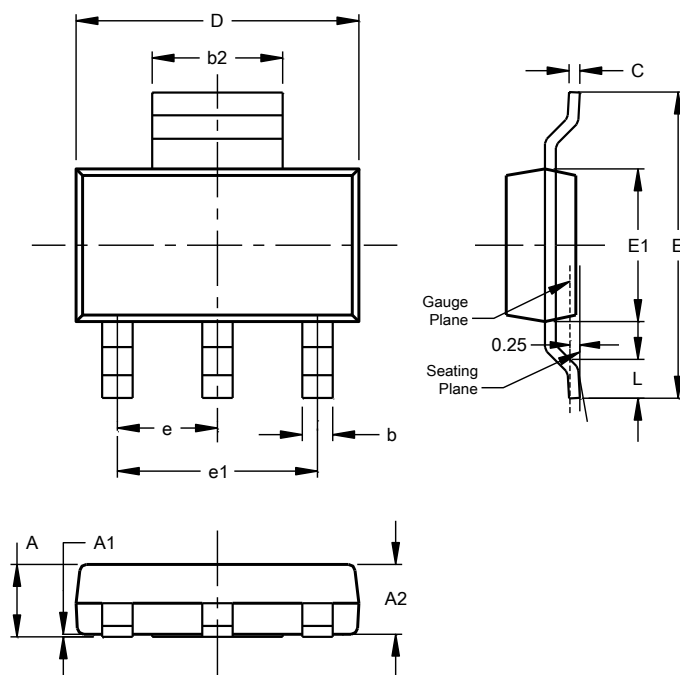


Switching time test circuit

Package Outline Dimensions

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

SOT223 (Type DN)

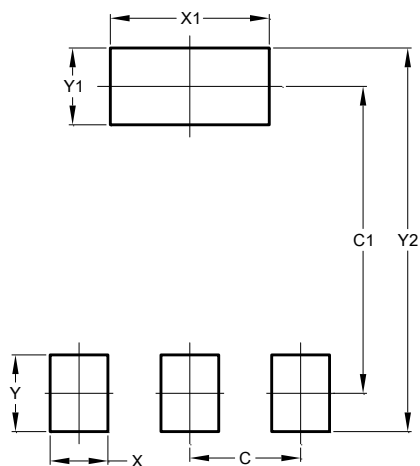


SOT223 (Type DN)			
Dim	Min	Max	Typ
A	--	1.70	--
A1	0.01	0.15	--
A2	1.50	1.68	1.60
b	0.60	0.80	0.70
b2	2.90	3.10	--
c	0.20	0.32	--
D	6.30	6.70	--
E	6.70	7.30	--
E1	3.30	3.70	--
e	--	--	2.30
e1	--	--	4.60
L	0.85	--	--
All Dimensions in mm			

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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