

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

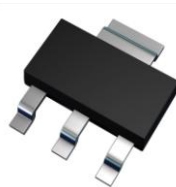
Features and Benefits

- 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**

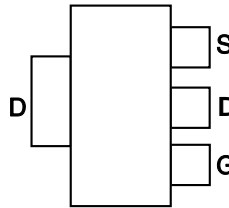
Mechanical Data

- Case: SOT223
- Case 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 208E3
- Weight: 0.112 grams (Approximate)

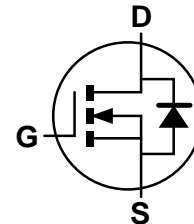
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

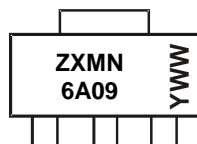
Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-------------|--------|--------------------|
| ZXMN6A09GTA | SOT223 | 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



ZXMN6A09 = Product Type Marking Code
 YWW = Date Code Marking
 Y = Last Digit of Year (ex: 9 = 2019)
 WW = Week Code (01 to 53)

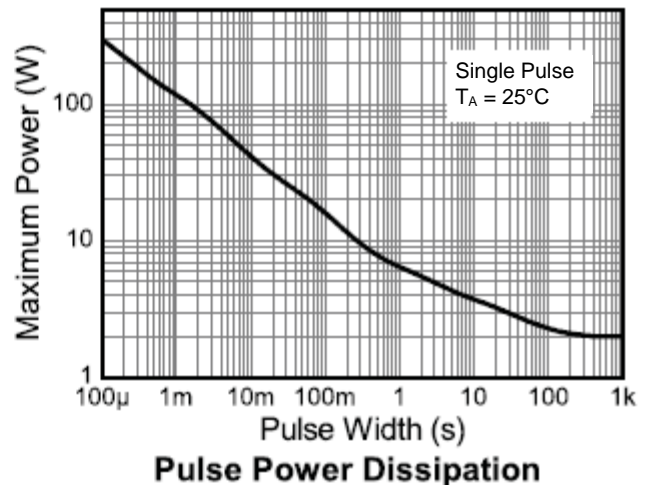
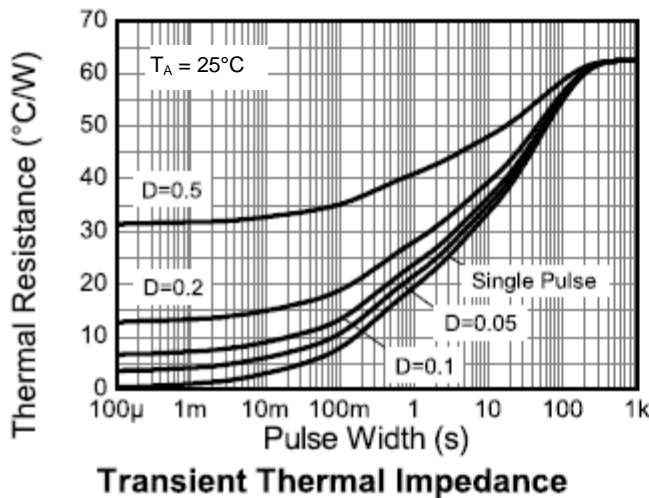
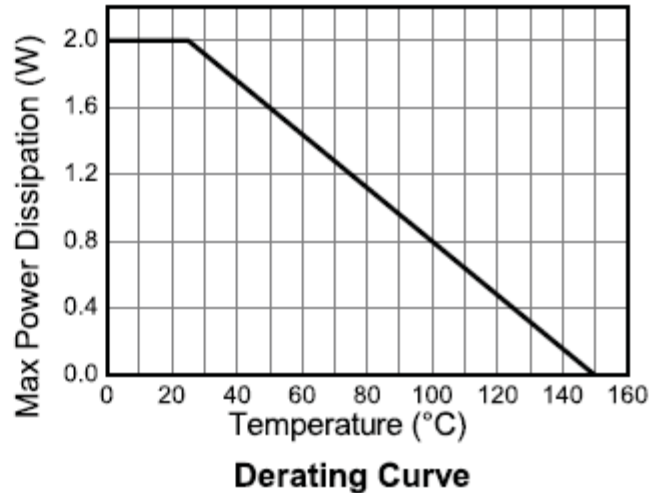
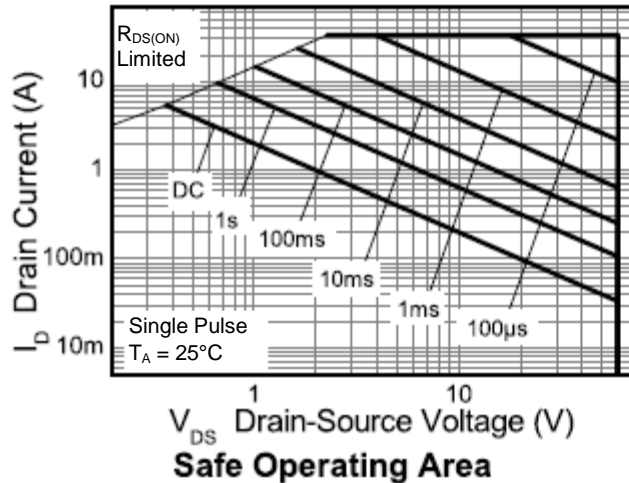
Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------|------|
| Drain-Source Voltage | V _{DS} | 60 | V |
| Gate-Source Voltage | V _{GS} | ±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 |

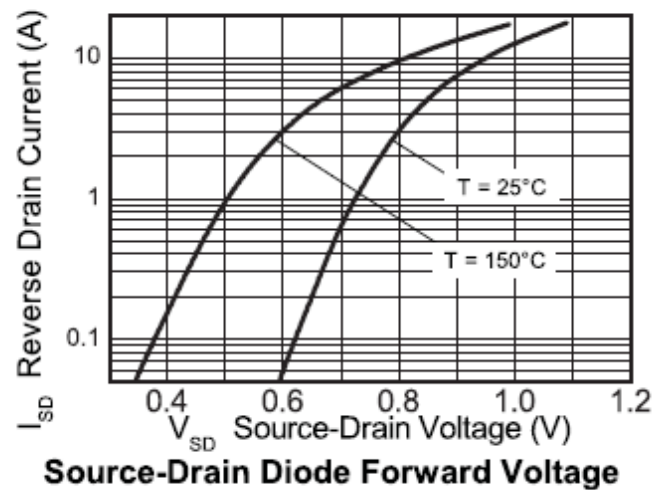
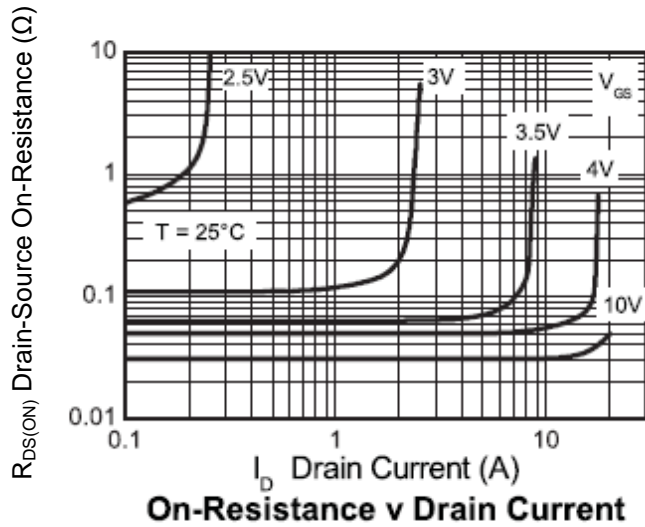
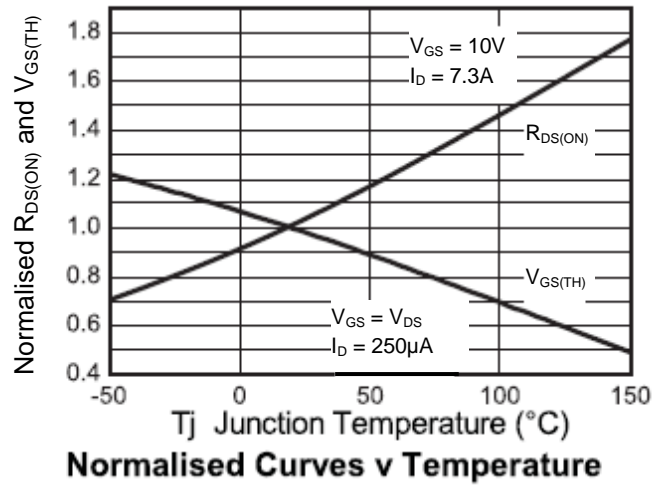
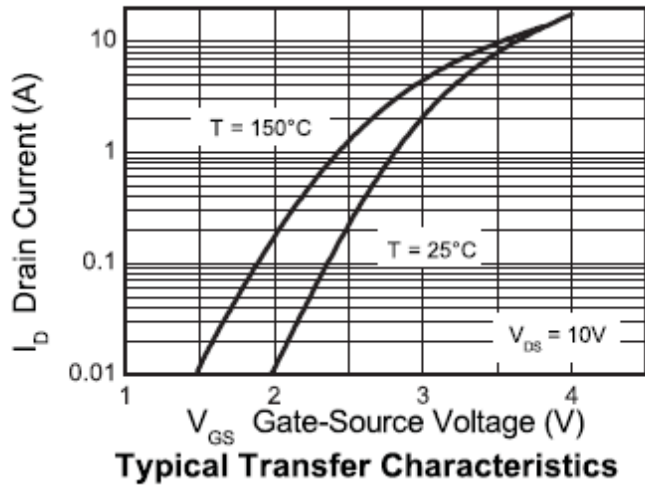
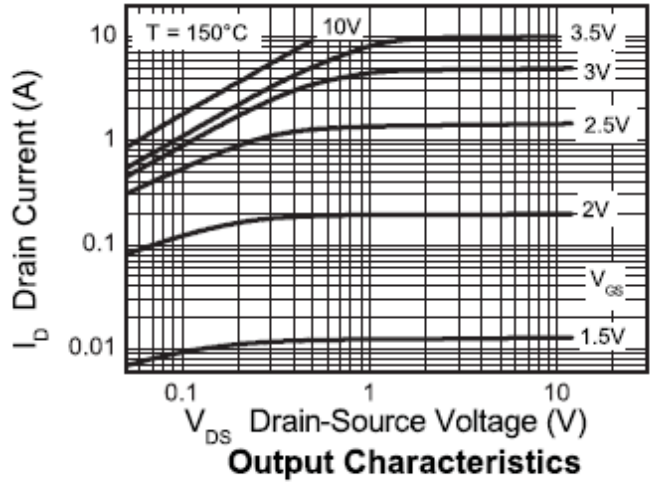
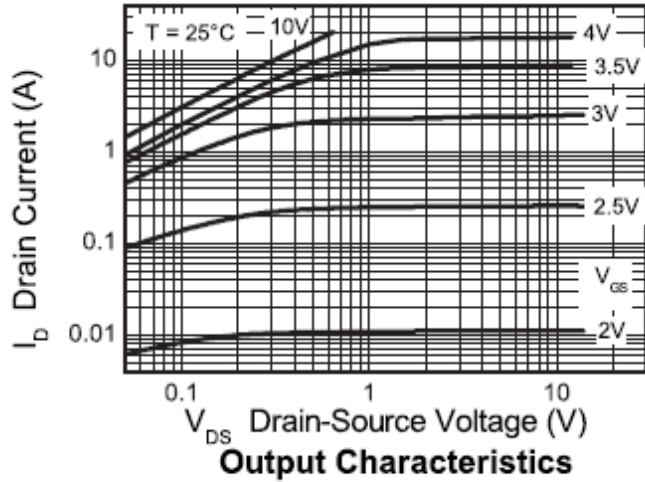
- Notes:
- For a device surface mounted on 25mm × 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
 - For a device surface mounted on FR-4 PCB measured at t ≤ 10s.
 - Repetitive rating 25mm × 25mm FR-4 PCB, D = 0.02 pulse width = 300μs - pulse width limited by maximum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

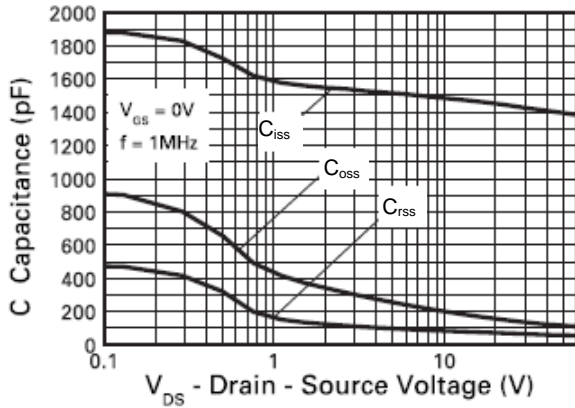


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

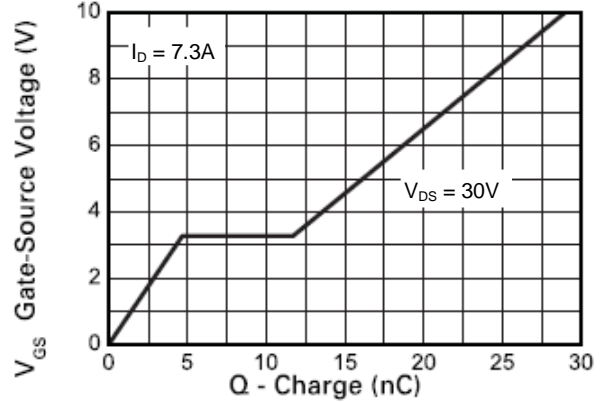
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|-----|------|------|------|---|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 60 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 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 (Notes 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.

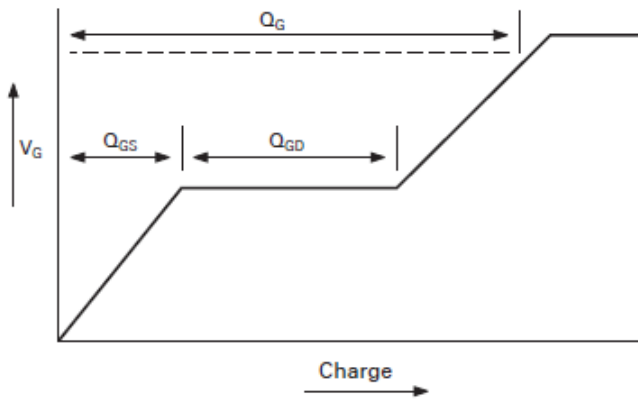




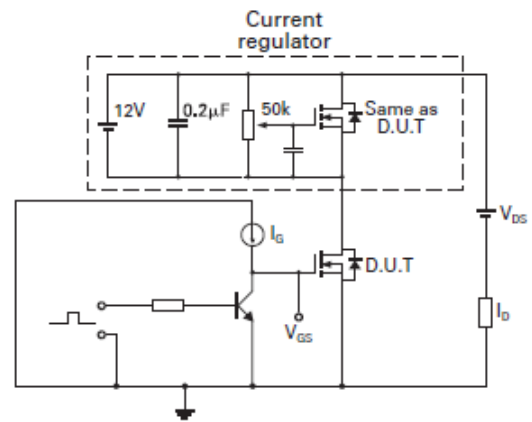
Capacitance v Drain-Source Voltage



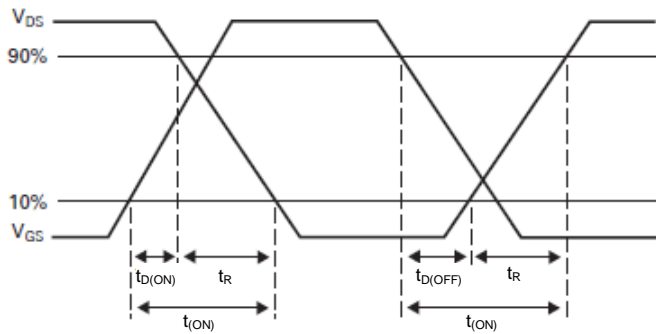
Gate-Source Voltage v Gate Charge



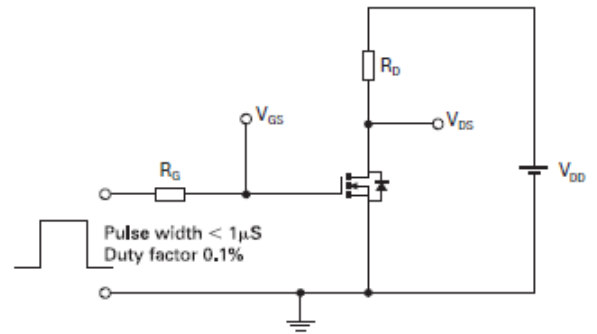
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms

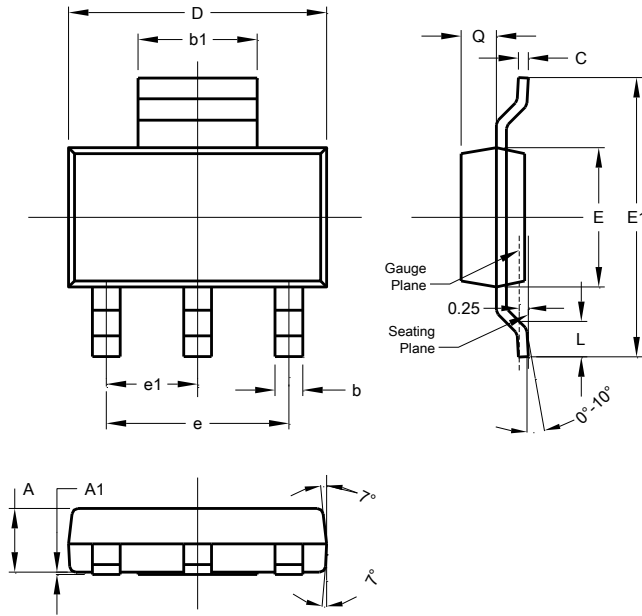


Switching time test circuit

Package Outline Dimensions

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

SOT223

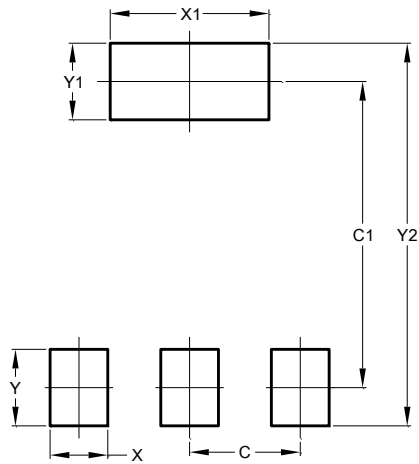


| SOT223 | | | |
|----------------------|-------|------|------|
| Dim | Min | Max | Typ |
| A | 1.55 | 1.65 | 1.60 |
| A1 | 0.010 | 0.15 | 0.05 |
| b | 0.60 | 0.80 | 0.70 |
| b1 | 2.90 | 3.10 | 3.00 |
| C | 0.20 | 0.30 | 0.25 |
| D | 6.45 | 6.55 | 6.50 |
| E | 3.45 | 3.55 | 3.50 |
| E1 | 6.90 | 7.10 | 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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