# 40V P-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ max | $I_D$ $T_A$ = +25°C |
|---|---|---|
| -40V | 60mΩ @ $V_{GS}$= -10V | -6.4A |
| | 100mΩ @ $V_{GS}$= -4.5V | -5.6A |

## 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Description and Applications

This new generation of Trench MOSFETs utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, and power management applications.

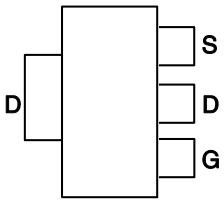
- DC-DC Converters
- Disconnect Switches
- Audio Output Stages
- Motor Control

## Mechanical Data

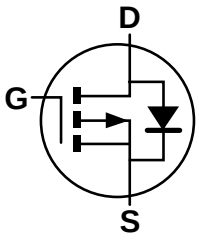
- Case: SOT223
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.112 grams (Approximate)

SOT223

Top View




Pin Out - Top View



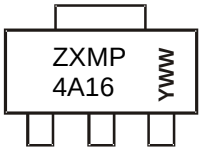

Equivalent Circuit

## Ordering Information (Note 5)

| Product | Case | Packaging |
|---|---|---|
| ZXMP4A16GQTA | SOT223 | 1,000/Tape & Reel |
| ZXMP4A16GQTC | SOT223 | 4,000/Tape & Reel |

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
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. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_grade_definitions/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

## Marking Information




ZXMP4A16 = Product Type Marking Code
YWW = Date Code Marking
Y = Year (ex: 4 = 2014)
WW = Week (01 - 53)

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

| Characteristic | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | -40 | V |
| Gate-Source Voltage | | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | $V_{GS}$ = 10V | (Note 7) | $I_D$ | -6.4 | A |
| | | $T_A$ = +70°C (Note 7) | | -4.6 | |
| | | (Note 6) | | -1.7 | |
| Pulsed Drain Current | $V_{GS}$= 10V | (Note 8) | $I_{DM}$ | -21 | A |
| Continuous Source Current (Body diode) | | (Note 7) | $I_S$ | -5.2 | A |
| Pulsed Source Current (Body diode) | | (Note 8) | $I_{SM}$ | -21 | A |

## Thermal Characteristics @$T_A$ = 25°C unless otherwise specified

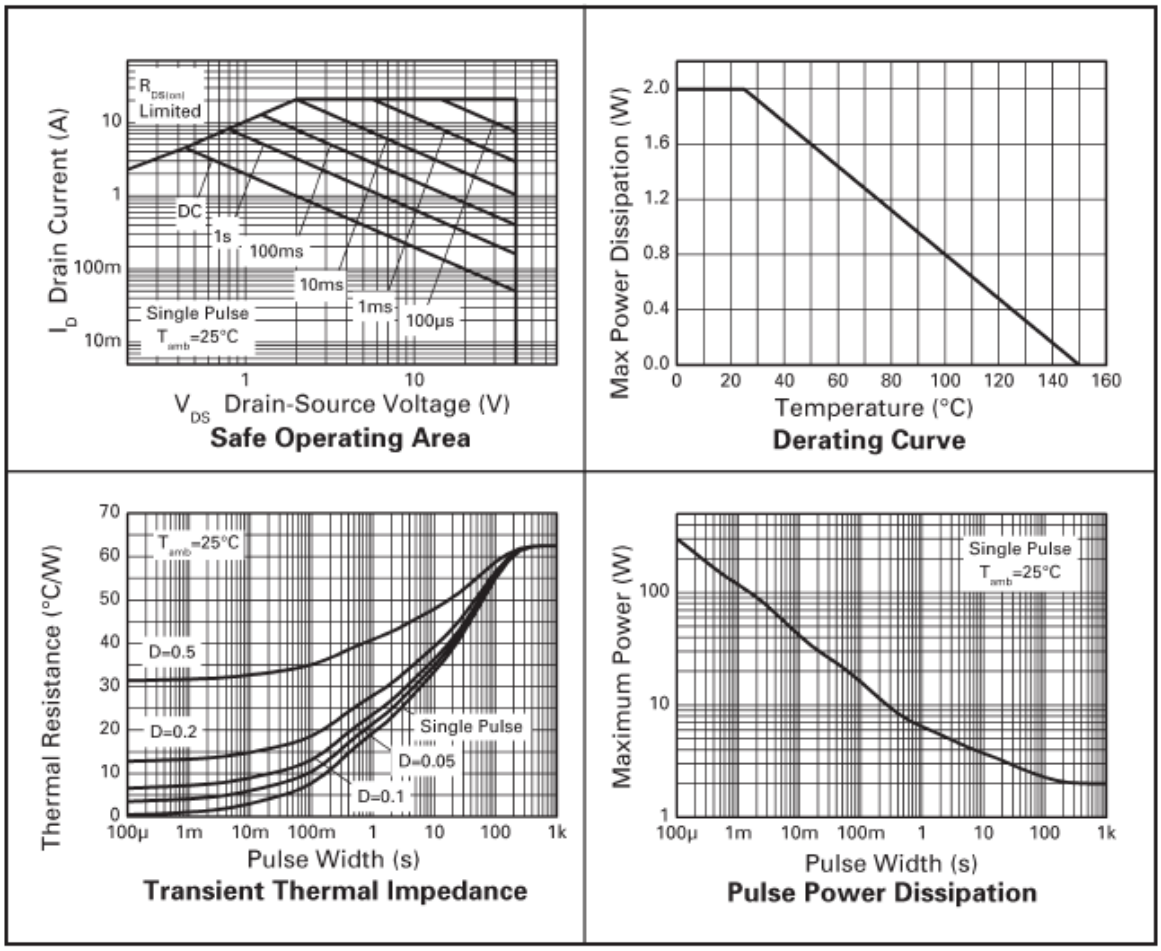
| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 6) | $P_D$ | 2.0 | W |
| Linear Derating Factor | | | 16 | mW/°C |
| | (Note 7) | | 3.9 | W |
| | | | 31 | mW/°C |
| Thermal Resistance, Junction to Ambient | (Note 6) | $R_{\theta JA}$ | 62.5 | °C/W |
| | (Note 7) | | 32.2 | |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 150 | °C |

## Electrical Characteristics @$T_A$ = 25°C unless otherwise specified

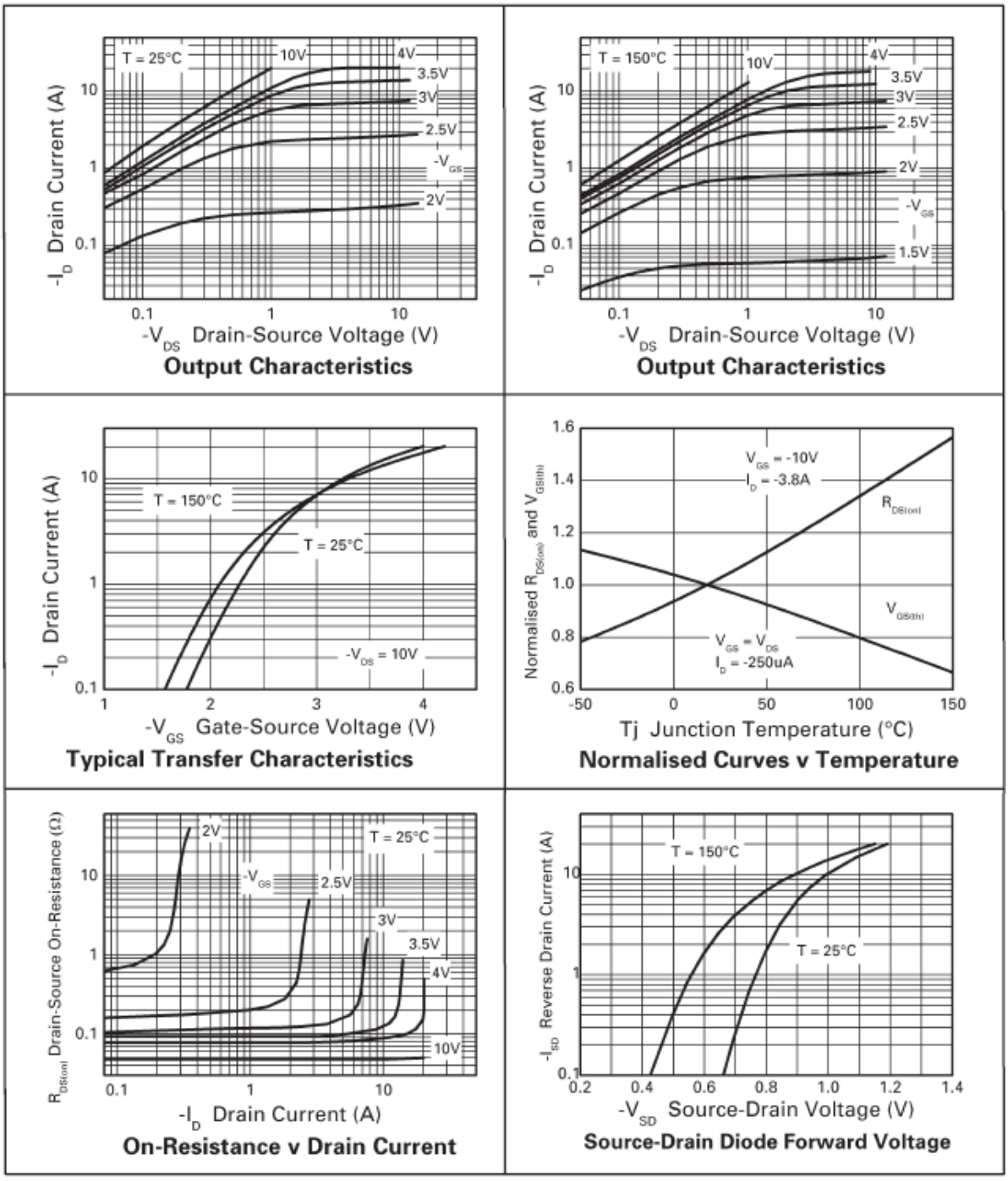
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -40 | — | — | V | $I_D$ = -250µA, $V_{GS}$= 0V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | -1 | µA | $V_{DS}$= -40V, $V_{GS}$= 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | 100 | nA | $V_{GS}$= ±20V, $V_{DS}$= 0V |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | -1.0 | — | — | V | $I_D$= -250µA, $V_{DS}$= $V_{GS}$ |
| Static Drain-Source On-Resistance (Note 9) | $R_{DS\ (ON)}$ | — | — | 0.060 | Ω | $V_{GS}$= -10V, $I_D$= -3.8A |
| | | | | 0.100 | | $V_{GS}$= -4.5V, $I_D$= -2.9A |
| Forward Transconductance (Notes 9 & 11) | $g_{fs}$ | — | 8.85 | — | S | $V_{DS}$= -15V, $I_D$= -3.8A |
| Diode Forward Voltage (Note 9) | $V_{SD}$ | — | -0.85 | -1.2 | V | $T_J$ = 25°C , $I_S$= -3.4A, $V_{GS}$= 0V |
| Reverse Recovery Time (Note 11) | $t_{rr}$ | | 27.2 | — | ns | $T_J$ = +25°C , $I_F$= -3A, di/dt= 100A/µs |
| Reverse Recovery Charge (Note 11) | $Q_{rr}$ | — | 25.4 | — | nC | |
| **DYNAMIC CHARACTERISTICS (Note 11)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 1007 | — | pF | $V_{DS}$= -20V, $V_{GS}$= 0V f= 1MHz |
| Output Capacitance | $C_{oss}$ | — | 130 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 85 | — | pF | |
| Total Gate Charge (Note 10) | $Q_g$ | — | 13.6 | — | nC | $V_{GS}$= -5V; $V_{DS}$= -20V, $I_D$= -3.8A |
| Total Gate Charge (Note 10) | $Q_g$ | — | 26.1 | — | nC | $V_{GS}$= -10V; $V_{DS}$= -20V, $I_D$= -3.8A |
| Gate-Source Charge (Note 10) | $Q_{gs}$ | — | 2.8 | — | nC | |
| Gate-Drain Charge (Note 10) | $Q_{gd}$ | — | 4.8 | — | nC | |
| Turn-On Delay Time (Note 10) | $t_{D(on)}$ | — | 3.0 | — | ns | $V_{DD}$= -20V, $V_{GS}$= -10V, $I_D$= -1A, $R_G \cong$ 6.0Ω |
| Turn-On Rise Time (Note 10) | $t_r$ | — | 3.5 | — | ns | |
| Turn-Off Delay Time (Note 10) | $t_{D(off)}$ | — | 13.4 | — | ns | |
| Turn-Off Fall Time (Note 10) | $t_f$ | — | 7.2 | — | ns | |

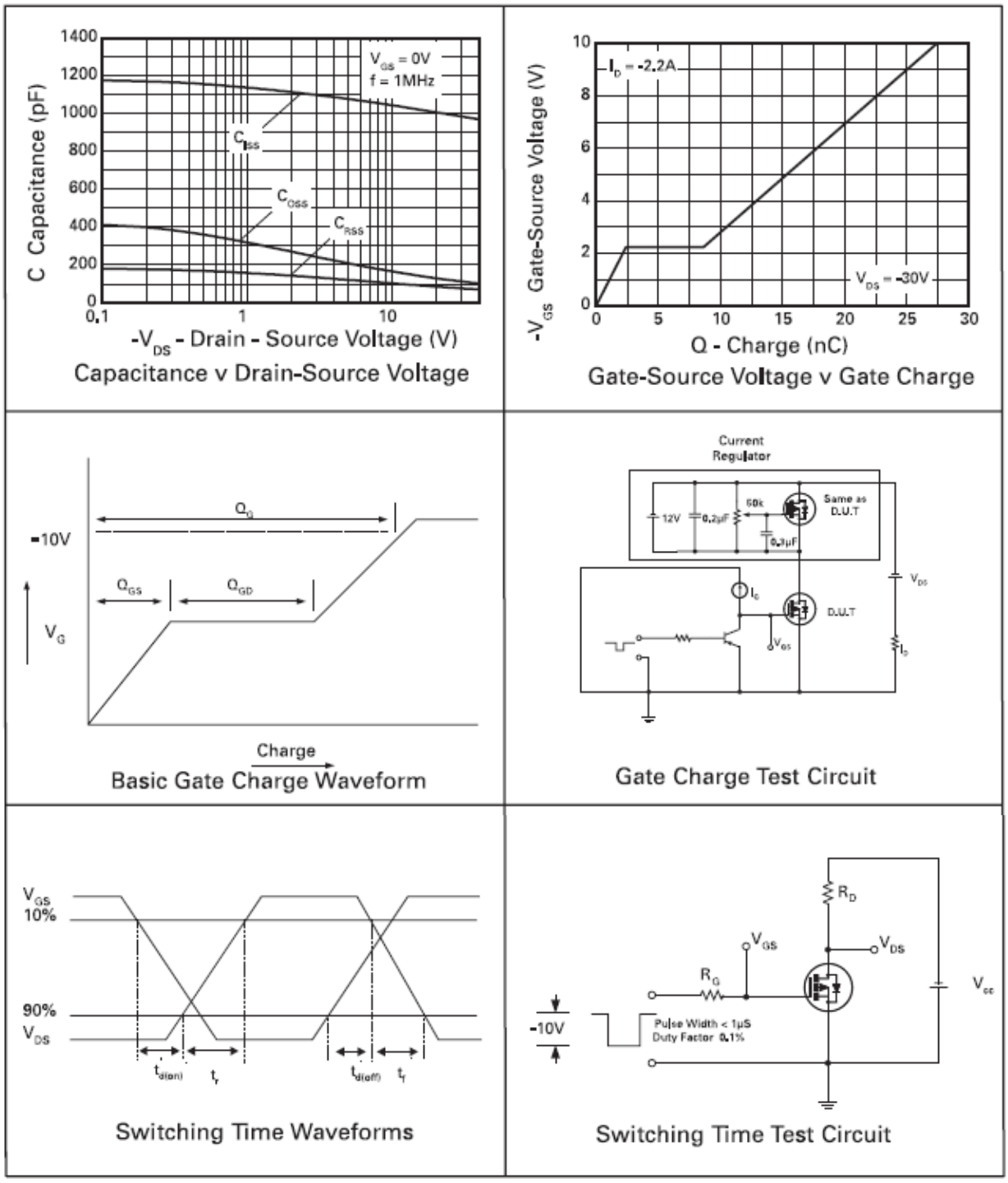
Notes:
6. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
7. For a device surface mounted on FR4 PCB measured at t ≤ 10 seconds.
8. For a device surface mounted on 25mm x 25mm FR4 PCB, D= 0.05 pulse width limited by maximum junction temperature.
9. Measured under pulsed conditions. Width ≤ 300µs. Duty cycle ≤ 2%.
10. Switching characteristics are independent of operating junction temperature.
11. For design aid only, not subject to production testing.

## CHARACTERISTICS



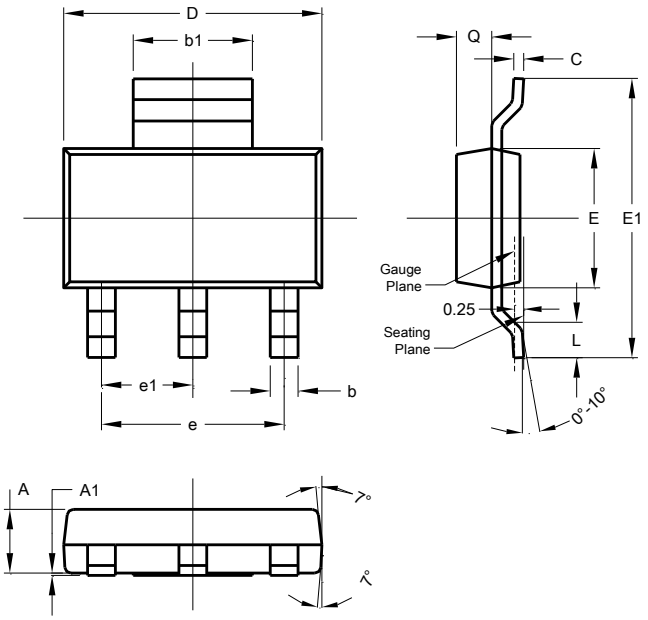
## TYPICAL CHARACTERISTICS





## Package Outline Dimensions

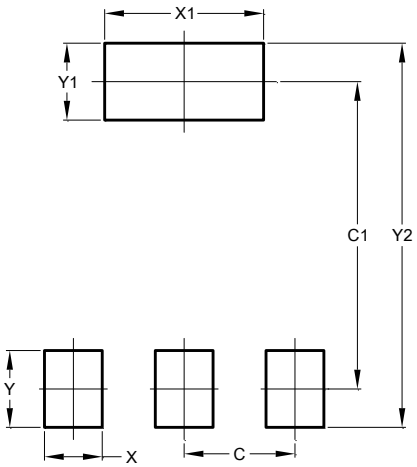
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.




| 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 AP02002 at http://www.diodes.com/datasheets/ap02002.pdf 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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