

Product Summary

| BV _{DSS} | R _{DS(ON)} Max | I _D T _A = +25°C |
|-------------------|---------------------------------|--|
| -100V | 250mΩ @ V _{GS} = -10V | -2.3A |
| | 300mΩ @ V _{GS} = -4.5V | -2.1A |

Description and Applications

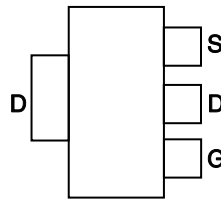
This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

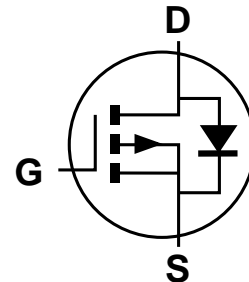
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

Features and Benefits

- Low Gate Drive
- Low Input Capacitance
- Fast Switching Speed
- **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

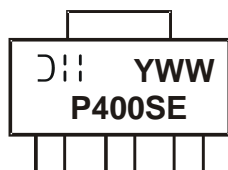
- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.112 grams (Approximate)

Ordering Information (Note 5)

| Part Number | Case | Packaging |
|-----------------|--------|---------------------|
| DMP10H400SEQ-13 | SOT223 | 2,500 / 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 http://www.diodes.com/product_compliance_definitions.html.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



= Manufacturer's Marking
 P400SE = Marking Code
 YWW = Date Code Marking
 Y or Y = Year (ex: 15 = 2015)
 WW = Week (01 to 53)

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

| Characteristic | Symbol | Value | Unit |
|---|------------------|------------------------|------|
| Drain-Source Voltage | V _{DSS} | -100 | V |
| Gate-Source Voltage | V _{GSS} | ±20 | V |
| Continuous Drain Current, V _{GS} = -10V (Note 6) | I _D | T _C = +25°C | -6.0 |
| | | T _A = +25°C | -2.3 |
| Maximum Body Diode Forward Current (Note 6) | I _S | -1.9 | A |
| Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%) | I _{DM} | -10 | A |

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

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|------------------------|------|
| Total Power Dissipation (Note 6) | P _D | T _A = +25°C | 2.0 |
| | | T _A = +70°C | 1.3 |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | 62 | °C/W |
| Total Power Dissipation (Note 6) | P _D | 13.7 | W |
| Thermal Resistance, Junction to Case (Note 6) | R _{θJC} | 9.1 | °C/W |
| 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 (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -100 | — | — | V | V _{GS} = 0V, I _D = -250µA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | µA | V _{DS} = -80V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -1.0 | -2.2 | -3.0 | V | V _{DS} = V _{GS} , I _D = -250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 203 | 250 | mΩ | V _{GS} = -10V, I _D = -5A |
| | | — | 241 | 300 | | V _{GS} = -4.5V, I _D = -5A |
| Diode Forward Voltage | V _{SD} | — | -0.9 | -1.2 | V | V _{GS} = 0V, I _S = -5A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{ISS} | — | 1239 | — | pF | V _{DS} = -25V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{OSS} | — | 42 | — | | |
| Reverse Transfer Capacitance | C _{RSS} | — | 28 | — | | |
| Gate Resistance | R _g | — | 13 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 8.4 | — | nC | V _{DS} = -60V, I _D = -5A |
| Total Gate Charge (V _{GS} = -10V) | Q _g | — | 17.5 | — | | |
| Gate-Source Charge | Q _{gs} | — | 2.8 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 3.2 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 9.1 | — | ns | V _{DD} = -50V, R _g = 9.1Ω, I _D = -5A |
| Turn-On Rise Time | t _r | — | 14.9 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 57.4 | — | | |
| Turn-Off Fall Time | t _f | — | 34.4 | — | | |
| Body Diode Reverse Recovery Time | t _{RR} | — | 25.2 | — | ns | V _{GS} = 0V, I _S = -5A, di/dt = 100A/µs |
| Body Diode Reverse Recovery Charge | Q _{RR} | — | 24.5 | — | nC | V _{GS} = 0V, I _S = -5A, di/dt = 100A/µs |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

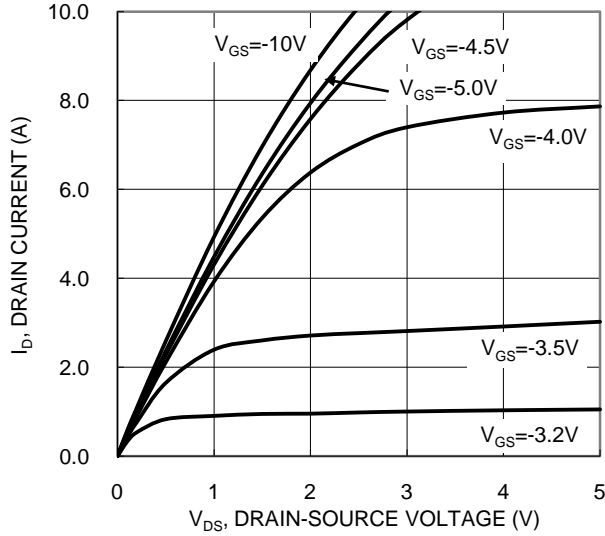


Figure 1. Typical Output Characteristic

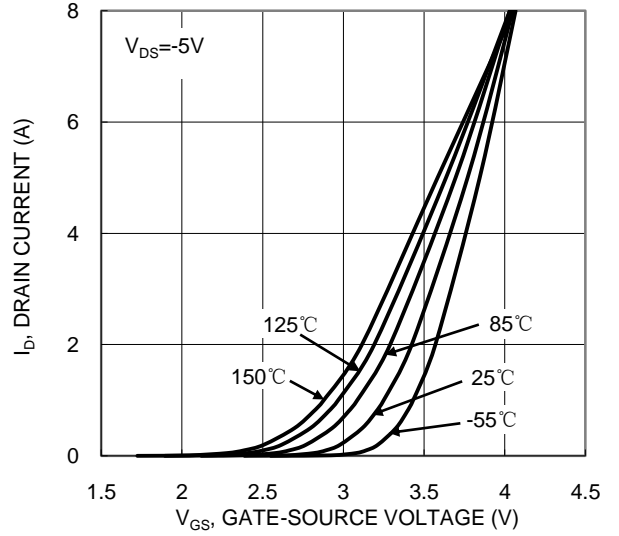


Figure 2. Typical Transfer Characteristic

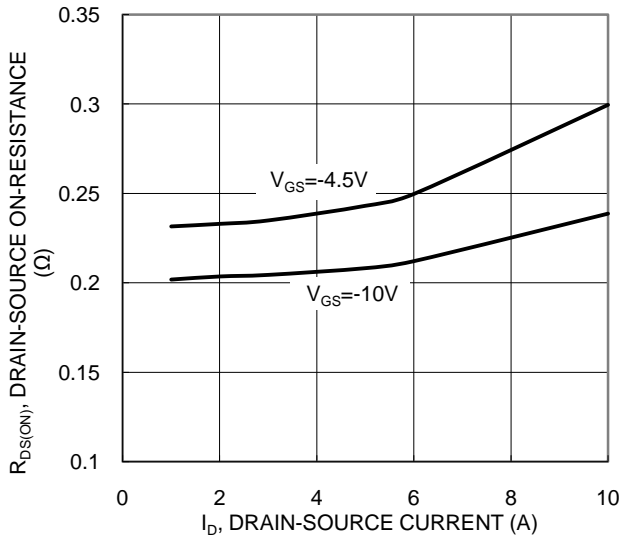


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

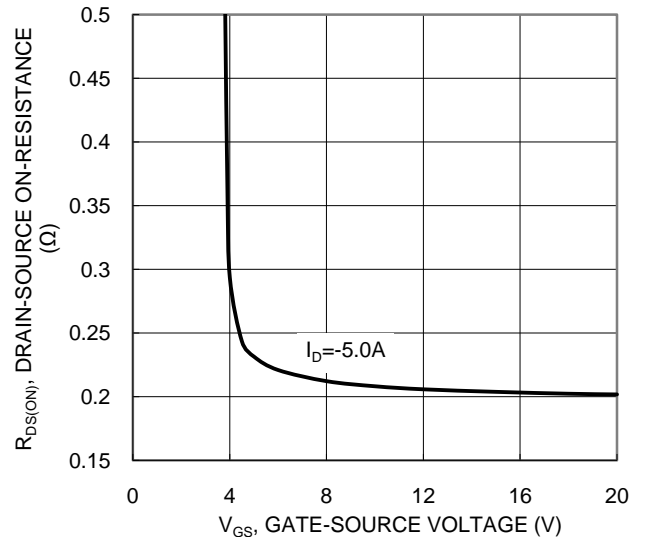


Figure 4. Typical Transfer Characteristic

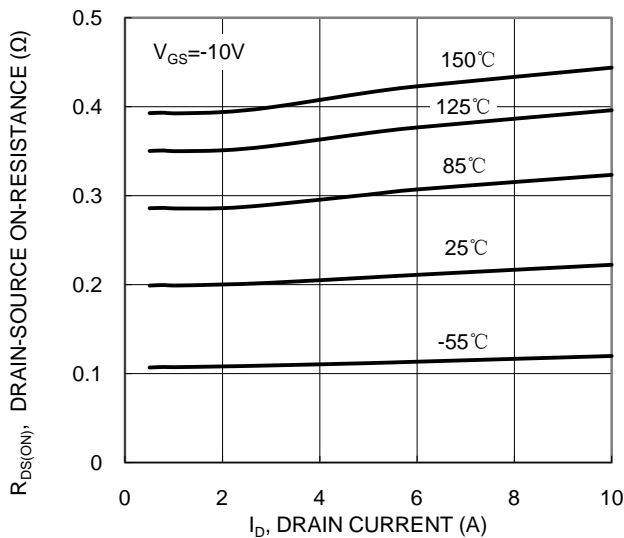


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

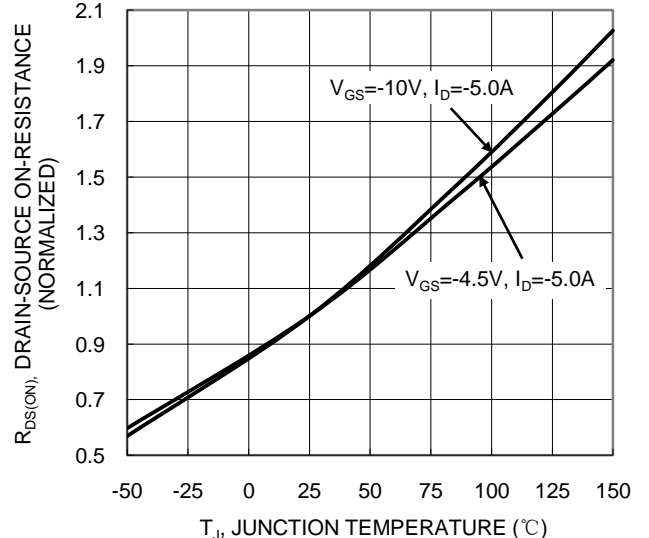


Figure 6. On-Resistance Variation with Junction Temperature

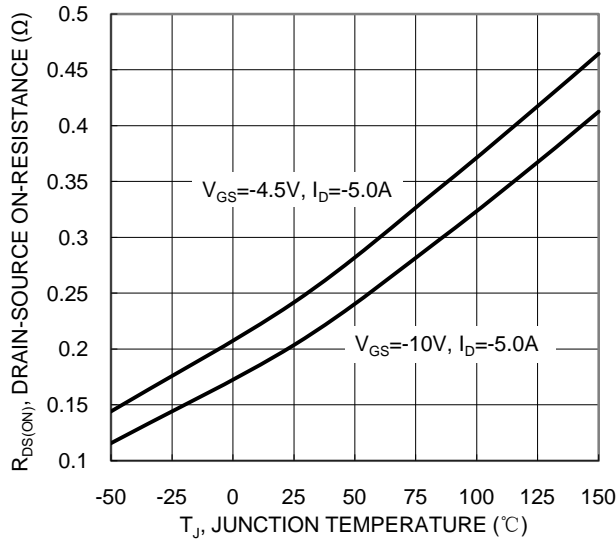


Figure 7. On-Resistance Variation with Junction Temperature

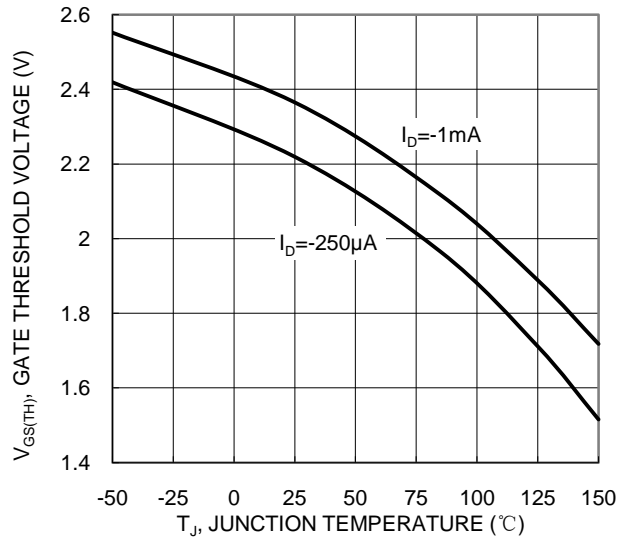


Figure 8. Gate Threshold Variation vs. Junction Temperature

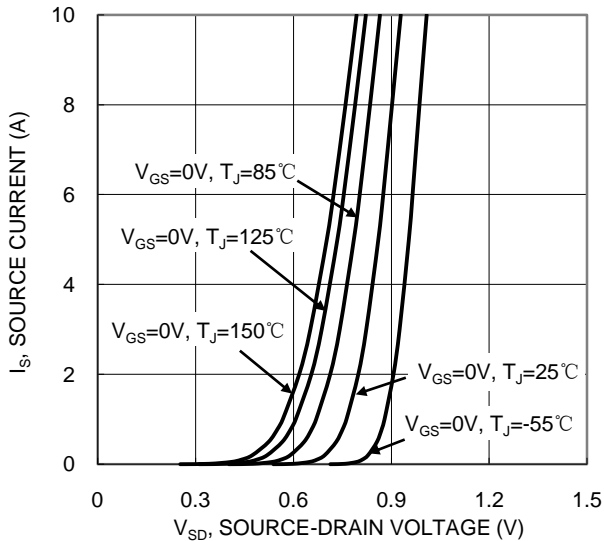


Figure 9. Diode Forward Voltage vs. Current

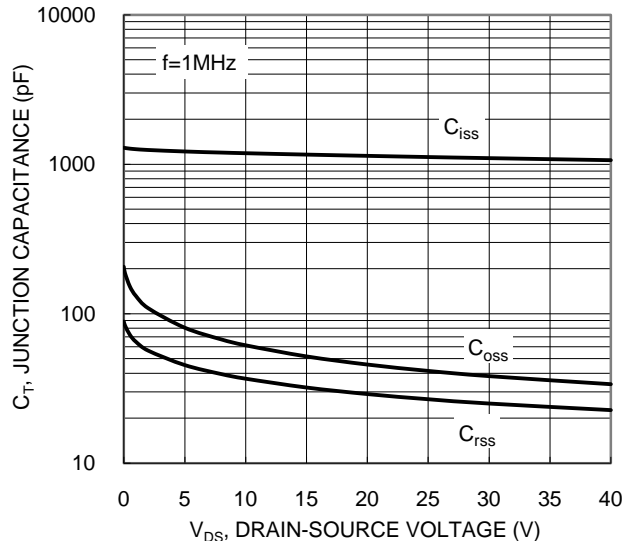


Figure 10. Typical Junction Capacitance

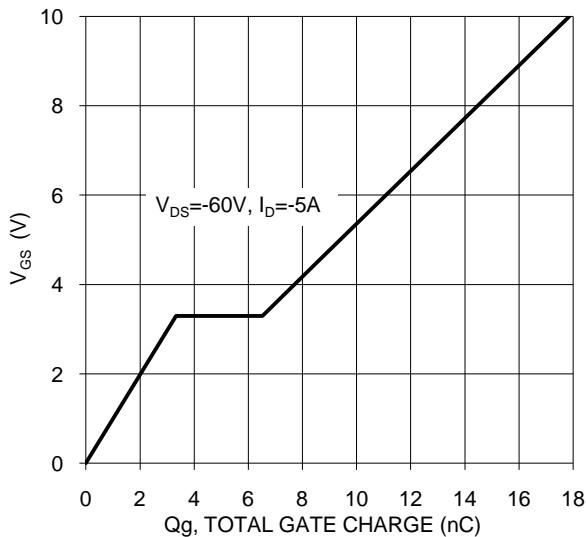


Figure 11. Gate Charge

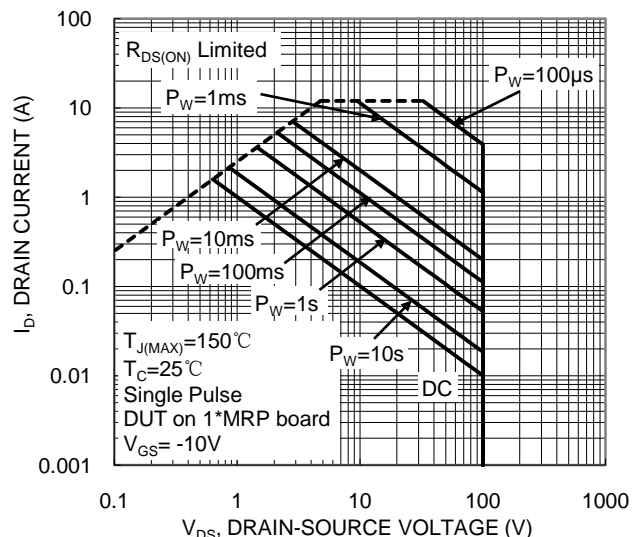


Figure 12. SOA, Safe Operation Area

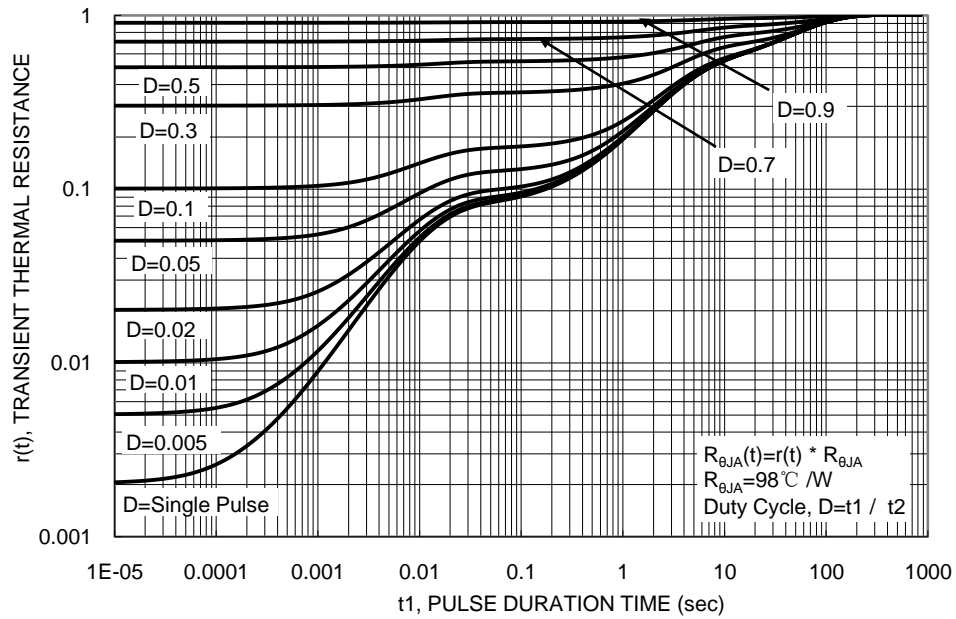
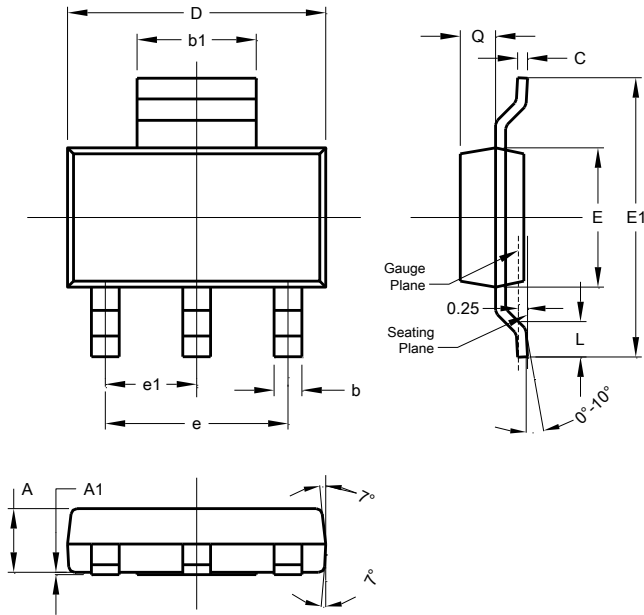


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

SOT223

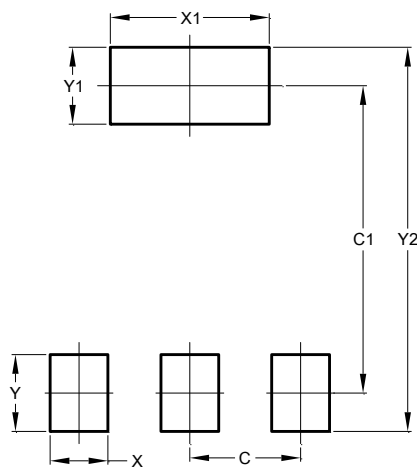


| SOT223 | | | |
|----------------------|-------|------|------|
| Dim | Min | Max | Typ |
| A | 1.55 | 1.65 | 1.60 |
| A1 | 0.010 | 0.15 | 0.05 |
| b | 0.60 | 0.80 | 0.70 |
| b1 | 2.90 | 3.10 | 3.00 |
| C | 0.20 | 0.30 | 0.25 |
| D | 6.45 | 6.55 | 6.50 |
| E | 3.45 | 3.55 | 3.50 |
| E1 | 6.90 | 7.10 | 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 AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> 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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