

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ | I_D $T_A = +25^\circ C$ |
|---------------|----------------------------------|------------------------------|
| -60V | 250m Ω @ $V_{GS} = -10V$ | -2.1A |
| | 300m Ω @ $V_{GS} = -4.5V$ | -1.9A |

Description

This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- Motor Control
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

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**

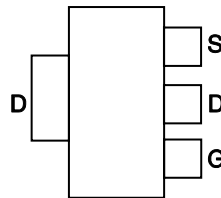
Mechanical Data

- 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 $\text{\textcircled{3}}$
- Weight: 0.112 grams (approximate)

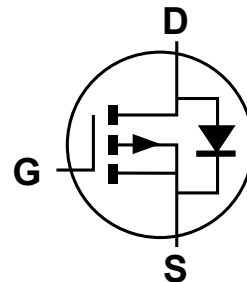
SOT223



Top View



Pin Out - Top View



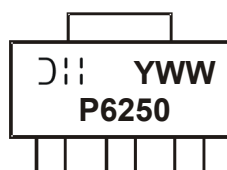
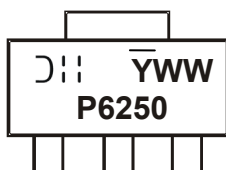
Equivalent Circuit

Ordering Information (Note 4)

| Part Number | Qualification | Case | Packaging |
|--------------|---------------|--------|---------------------|
| DMP6250SE-13 | Standard | 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



$\text{\textcircled{D}}$ = Manufacturer's Marking
 P6250 = Marking Code
 YWW = Date Code Marking for SAT (Shanghai Assembly/ Test site)
 \bar{Y} WW = Date Code Marking for CAT (Chengdu Assembly/ Test site)
 Y or \bar{Y} = Year (ex: 3 = 2013)
 WW = Week (01 - 53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|--|--------------|------|
| Drain-Source voltage | V_{DSS} | -60 | V |
| Gate-Source voltage (Note 5) | V_{GS} | ± 20 | V |
| Continuous Drain current (Note 6) $V_{GS} = -10\text{V}$ | $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$ | -2.1 -1.7 | A |
| | $T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$ | -6.1 -4.9 | A |
| Maximum Body Diode Continuous Current | I_S | -1.8 | A |
| Pulsed Drain Current (10 μs pulse, duty cycle = 1%) | I_{DM} | -11 | A |
| Single Pulsed Avalanche Current (Note 7) $L = 0.1\text{mH}$ | I_{AS} | -12 | A |
| Single Pulsed Avalanche Energy (Note 7) $L = 0.1\text{mH}$ | E_{AS} | 8 | mJ |

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Units |
|--|-----------------|---------------------------|--------------------|
| Total Power Dissipation (Note 6) | P_D | $T_A = +25^\circ\text{C}$ | 1.8 |
| | | $T_A = +70^\circ\text{C}$ | 1.1 |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | 69 | $^\circ\text{C/W}$ |
| Total Power Dissipation (Note 6) | P_D | 14 | W |
| Thermal Resistance, Junction to Case (Note 6) | $R_{\theta JC}$ | 8.7 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------|-----|------|-----------|---------------|---|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | -60 | — | — | V | $I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | -1 | μA | $V_{DS} = -60\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | — | — | ± 100 | nA | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | -1 | — | -3 | V | $V_{DS} = V_{GS}, I_D = -250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | — | — | 250 | m Ω | $V_{GS} = -10\text{V}, I_D = -1.0\text{A}$ |
| | | | | 300 | | $V_{GS} = -4.5\text{V}, I_D = -0.5\text{A}$ |
| Diode Forward Voltage | V_{SD} | — | — | -1.2 | V | $V_{GS} = 0\text{V}, I_S = -2.0\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C_{iss} | — | 551 | — | pF | $V_{DS} = -30\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$ |
| Output Capacitance | C_{oss} | — | 25.7 | — | pF | |
| Reverse Transfer Capacitance | C_{rss} | — | 19.1 | — | pF | |
| Gate Resistance | R_g | — | 12.1 | — | Ω | $V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Total Gate Charge ($V_{GS} = -4.5\text{V}$) | Q_g | — | 4.8 | — | nC | $V_{DS} = -30\text{V}, I_D = -2\text{A}$ |
| Total Gate Charge ($V_{GS} = -10\text{V}$) | Q_g | — | 9.7 | — | nC | |
| Gate-Source Charge | Q_{gs} | — | 1.5 | — | nC | |
| Gate-Drain Charge | Q_{gd} | — | 1.6 | — | nC | |
| Turn-On Delay Time | $t_{D(on)}$ | — | 6.3 | — | ns | $V_{DS} = -30\text{V}, V_{GS} = -10\text{V},$ $R_G = 50\Omega, I_D = -1\text{A}$ |
| Turn-On Rise Time | t_r | — | 10.3 | — | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | — | 91.4 | — | ns | |
| Turn-Off Fall Time | t_f | — | 39.8 | — | ns | |
| Reverse recovery time | t_{rr} | — | 9.2 | — | ns | $I_S = -1\text{A}, di/dt = 100\text{A}/\mu\text{s}$ |
| Reverse recovery charge | Q_{rr} | — | 3.9 | — | nC | |

- Notes:
- AEC-Q101 V_{GS} maximum is $\pm 16\text{V}$.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - IAR and EAR rating are based on low frequency and duty cycles to keep $T_J = 25^\circ\text{C}$
 - Short duration pulse test used to minimize self-heating effect.
 - For design aid only, not subject to production testing.

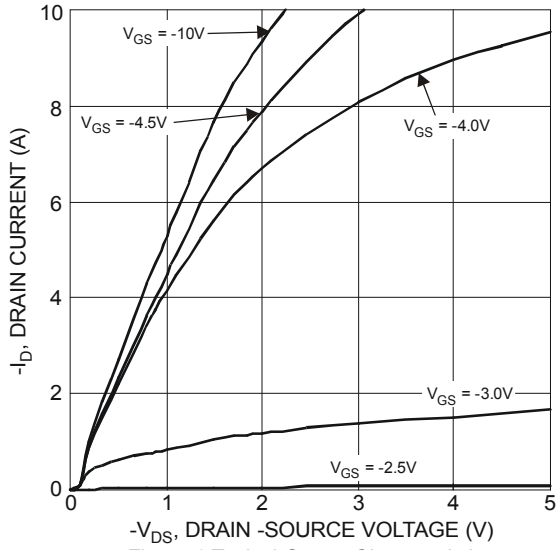


Figure 1 Typical Output Characteristics

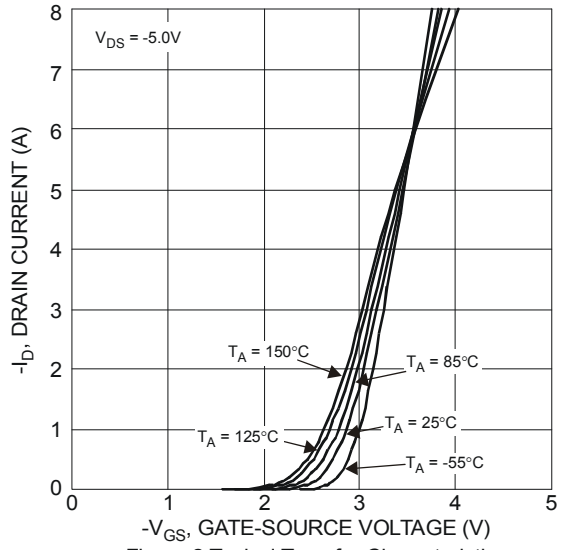


Figure 2 Typical Transfer Characteristics

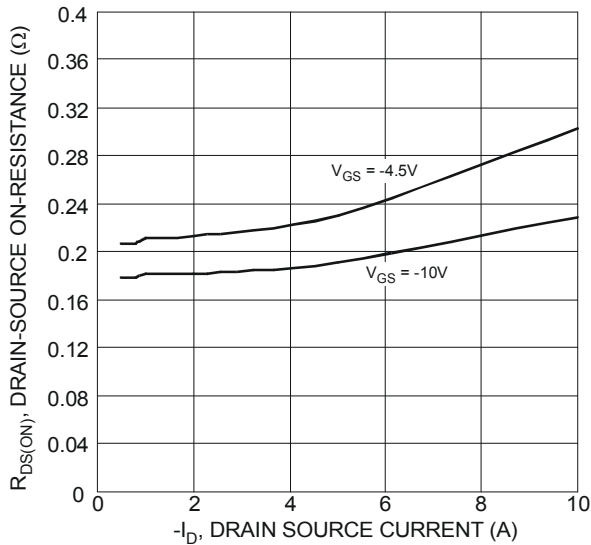


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

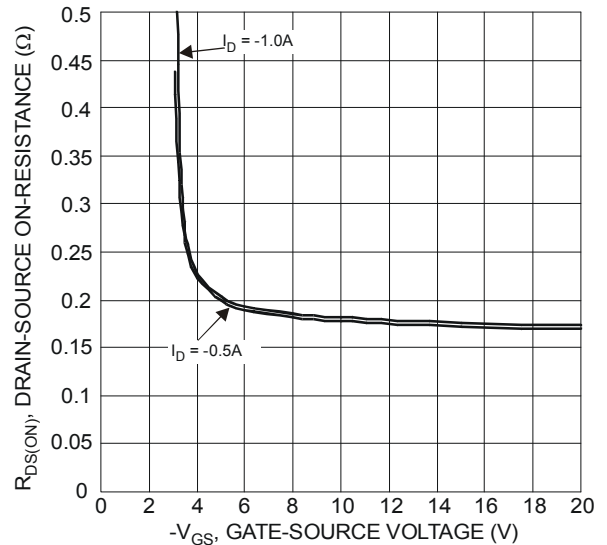


Figure 4 Typical Transfer Characteristics

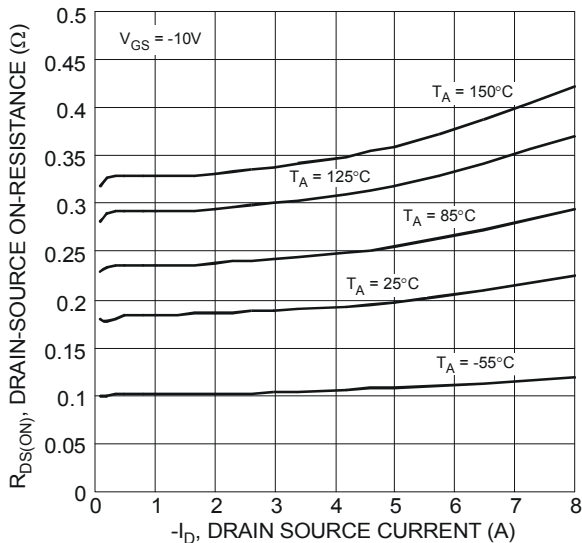


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

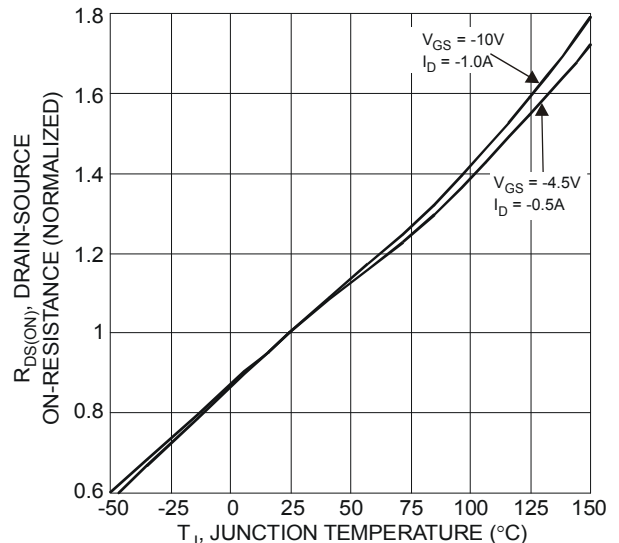


Figure 6 On-Resistance Variation with Temperature

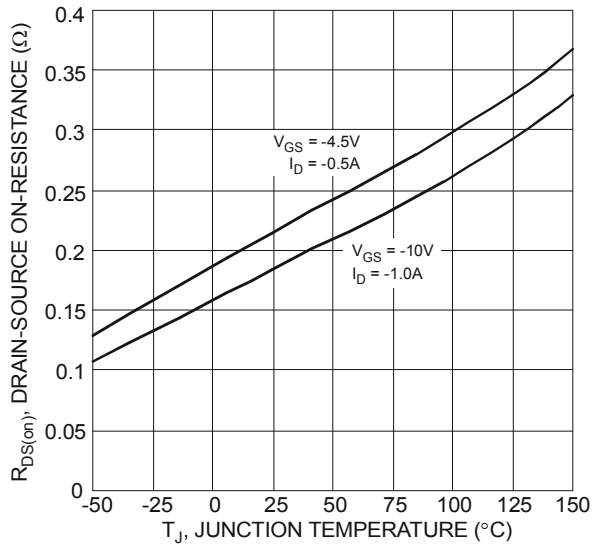


Figure 7 On-Resistance Variation with Temperature

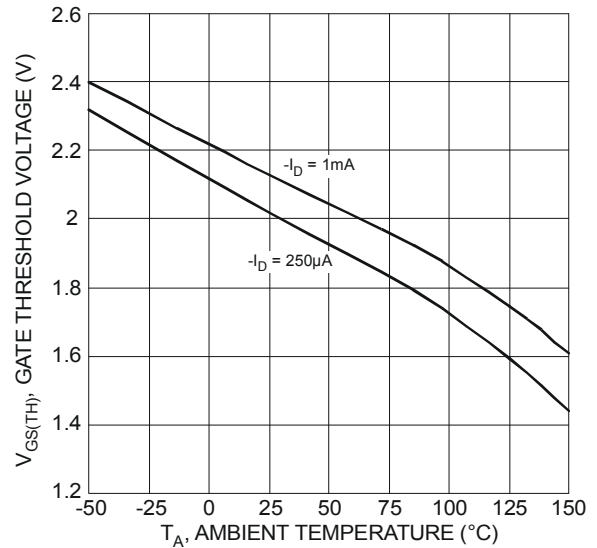


Figure 8 Gate Threshold Variation vs. Ambient Temperature

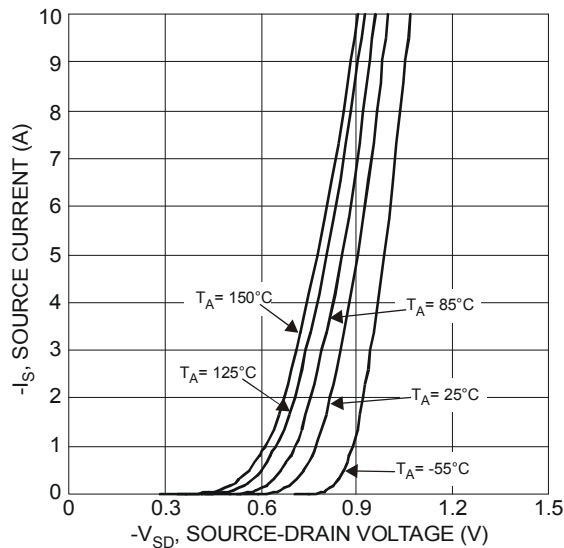


Figure 9 Diode Forward Voltage vs. Current

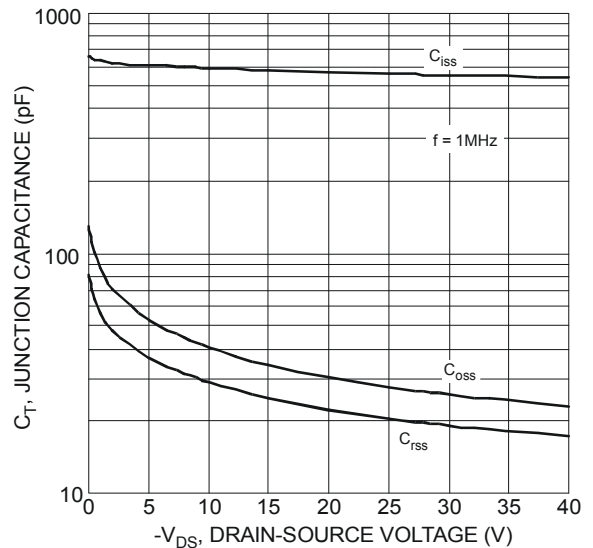


Figure 10 Typical Junction Capacitance

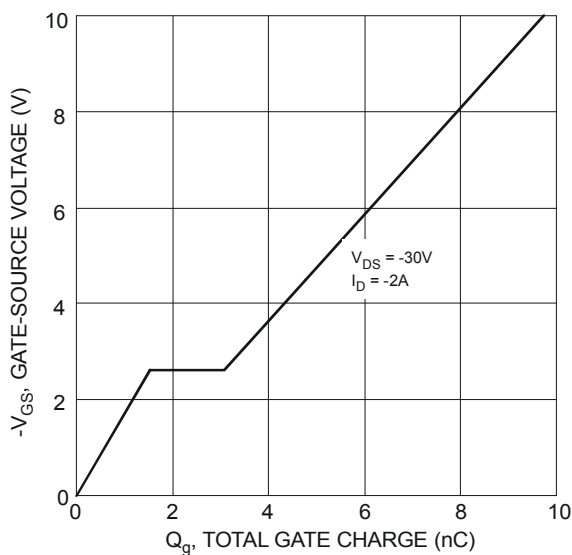


Figure 11 Gate-Charge Characteristics

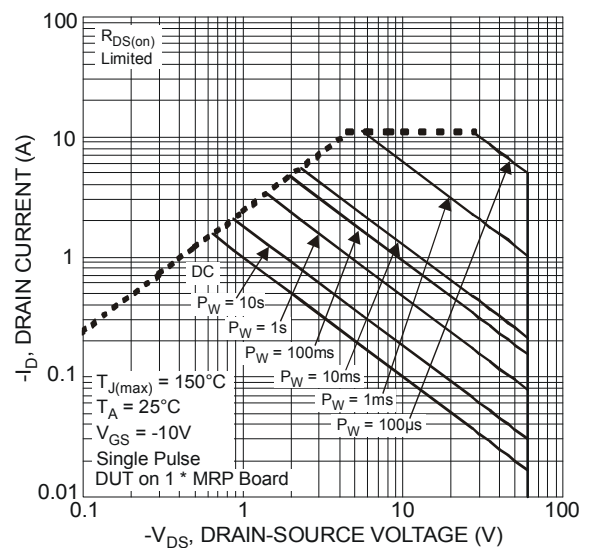


Figure 12 SOA, Safe Operation Area

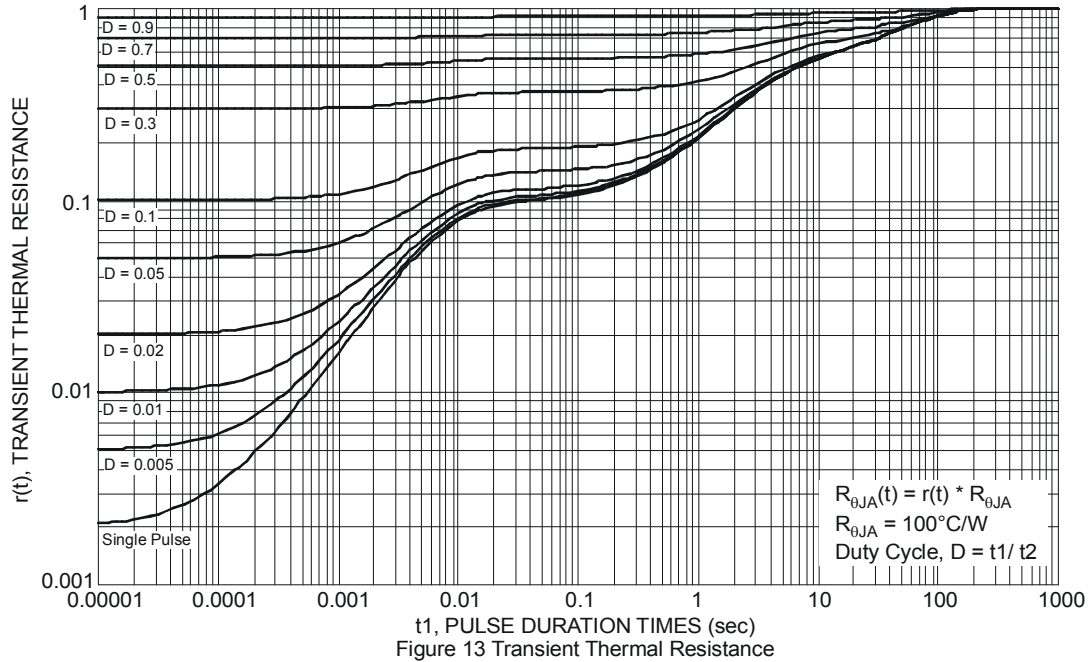
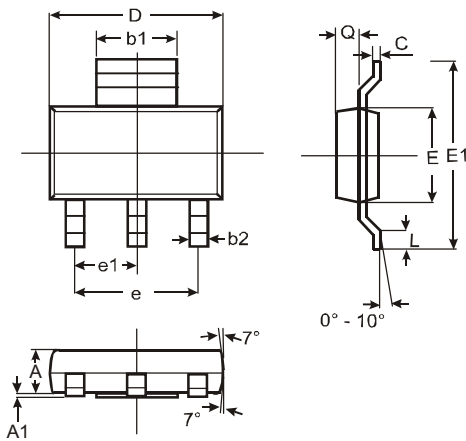


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

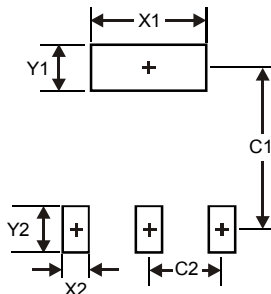
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT223 | | | |
|----------------------|-------|------|------|
| Dim | Min | Max | Typ |
| A | 1.55 | 1.65 | 1.60 |
| A1 | 0.010 | 0.15 | 0.05 |
| b1 | 2.90 | 3.10 | 3.00 |
| b2 | 0.60 | 0.80 | 0.70 |
| 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.



| Dimensions | Value (in mm) |
|------------|---------------|
| X1 | 3.3 |
| X2 | 1.2 |
| Y1 | 1.6 |
| Y2 | 1.6 |
| C1 | 6.4 |
| C2 | 2.3 |

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