

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max         | I <sub>D</sub><br>T <sub>A</sub> = +25°C |
|-------------------|---------------------------------|------------------------------------------|
| -100V             | 250mΩ @ V <sub>GS</sub> = -10V  | -2.3A                                    |
|                   | 300mΩ @ V <sub>GS</sub> = -4.5V | -2.1A                                    |

## Description and Applications

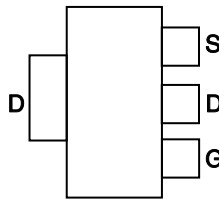
This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

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

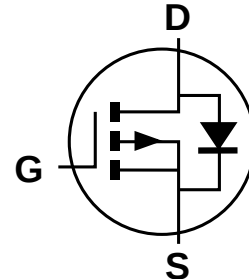
SOT223



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

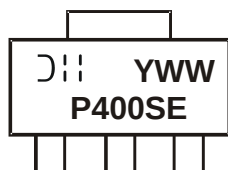
- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method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



DII = 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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                            |              |                                                  | Symbol           | Value        | Unit |
|-----------------------------------------------------------|--------------|--------------------------------------------------|------------------|--------------|------|
| Drain-Source Voltage                                      |              |                                                  | V <sub>DSS</sub> | -100         | V    |
| Gate-Source Voltage                                       |              |                                                  | V <sub>GSS</sub> | ±20          | V    |
| Continuous Drain Current, V <sub>GS</sub> = -10V (Note 6) | Steady State | T <sub>C</sub> = +25°C<br>T <sub>A</sub> = +25°C | I <sub>D</sub>   | -6.0<br>-2.3 | A    |
| Maximum Body Diode Forward Current (Note 6)               |              |                                                  | I <sub>S</sub>   | -1.9         | A    |
| Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)       |              |                                                  | I <sub>DM</sub>  | -10          | A    |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                   |                        | Symbol                            | Value       | Unit |
|--------------------------------------------------|------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 6)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 2.0         | W    |
|                                                  | T <sub>A</sub> = +70°C |                                   | 1.3         |      |
| Thermal Resistance, Junction to Ambient (Note 6) |                        | R <sub>θJA</sub>                  | 62          | °C/W |
| Total Power Dissipation (Note 6)                 |                        | P <sub>D</sub>                    | 13.7        | W    |
| Thermal Resistance, Junction to Case (Note 6)    |                        | R <sub>θJC</sub>                  | 9.1         | °C/W |
| Operating and Storage Temperature Range          |                        | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                              | Symbol              | Min  | Typ  | Max  | Unit | Test Condition                                                      |
|---------------------------------------------|---------------------|------|------|------|------|---------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 7)</b>         |                     |      |      |      |      |                                                                     |
| Drain-Source Breakdown Voltage              | BV <sub>DSS</sub>   | -100 | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250µA                       |
| Zero Gate Voltage Drain Current             | I <sub>DSS</sub>    | —    | —    | 1    | µA   | V <sub>DS</sub> = -80V, V <sub>GS</sub> = 0V                        |
| Gate-Source Leakage                         | I <sub>GSS</sub>    | —    | —    | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                        |
| <b>ON CHARACTERISTICS (Note 7)</b>          |                     |      |      |      |      |                                                                     |
| Gate Threshold Voltage                      | V <sub>GS(TH)</sub> | -1.0 | -2.2 | -3.0 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA         |
| Static Drain-Source On-Resistance           | R <sub>DS(ON)</sub> | —    | 203  | 250  | mΩ   | V <sub>GS</sub> = -10V, I <sub>D</sub> = -5A                        |
|                                             |                     | —    | 241  | 300  |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A                       |
| Diode Forward Voltage                       | V <sub>SD</sub>     | —    | -0.9 | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -5A                          |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>     |                     |      |      |      |      |                                                                     |
| Input Capacitance                           | C <sub>ISS</sub>    | —    | 1239 | —    | pF   | V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, f = 1.0MHz            |
| Output Capacitance                          | C <sub>OSS</sub>    | —    | 42   | —    |      |                                                                     |
| Reverse Transfer Capacitance                | C <sub>ISS</sub>    | —    | 28   | —    |      |                                                                     |
| Gate Resistance                             | R <sub>g</sub>      | —    | 13   | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz              |
| Total Gate Charge (V <sub>GS</sub> = -4.5V) | Q <sub>g</sub>      | —    | 8.4  | —    | nC   | V <sub>DS</sub> = -60V, I <sub>D</sub> = -5A                        |
| Total Gate Charge (V <sub>GS</sub> = -10V)  | Q <sub>g</sub>      | —    | 17.5 | —    |      |                                                                     |
| Gate-Source Charge                          | Q <sub>gs</sub>     | —    | 2.8  | —    |      |                                                                     |
| Gate-Drain Charge                           | Q <sub>gd</sub>     | —    | 3.2  | —    |      |                                                                     |
| Turn-On Delay Time                          | t <sub>D(ON)</sub>  | —    | 9.1  | —    | ns   | V <sub>DD</sub> = -50V, R <sub>g</sub> = 9.1Ω, I <sub>D</sub> = -5A |
| Turn-On Rise Time                           | t <sub>r</sub>      | —    | 14.9 | —    |      |                                                                     |
| Turn-Off Delay Time                         | t <sub>D(OFF)</sub> | —    | 57.4 | —    |      |                                                                     |
| Turn-Off Fall Time                          | t <sub>f</sub>      | —    | 34.4 | —    |      |                                                                     |
| Body Diode Reverse Recovery Time            | t <sub>RR</sub>     | —    | 25.2 | —    | ns   | V <sub>GS</sub> = 0V, I <sub>S</sub> = -5A, di/dt = 100A/µs         |
| Body Diode Reverse Recovery Charge          | Q <sub>RR</sub>     | —    | 24.5 | —    | nC   | V <sub>GS</sub> = 0V, I <sub>S</sub> = -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.

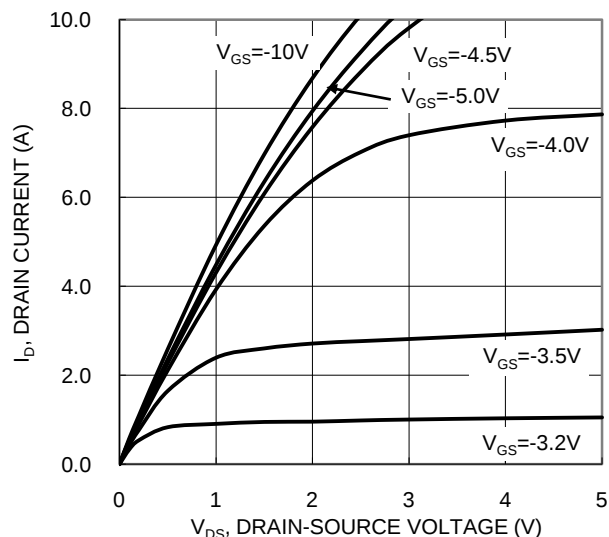


Figure 1. Typical Output Characteristic

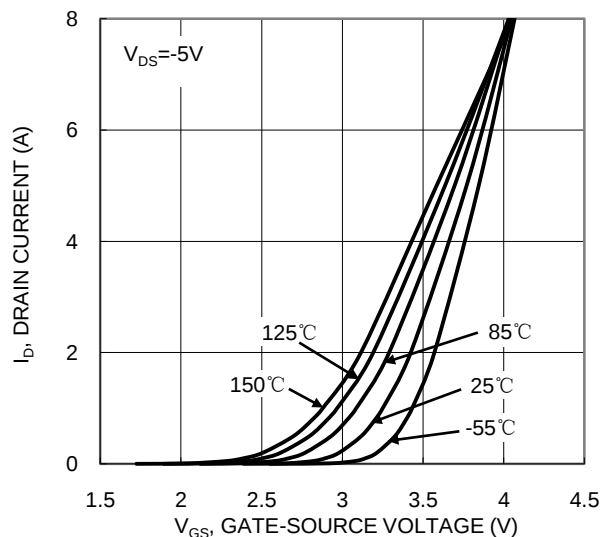


Figure 2. Typical Transfer Characteristic

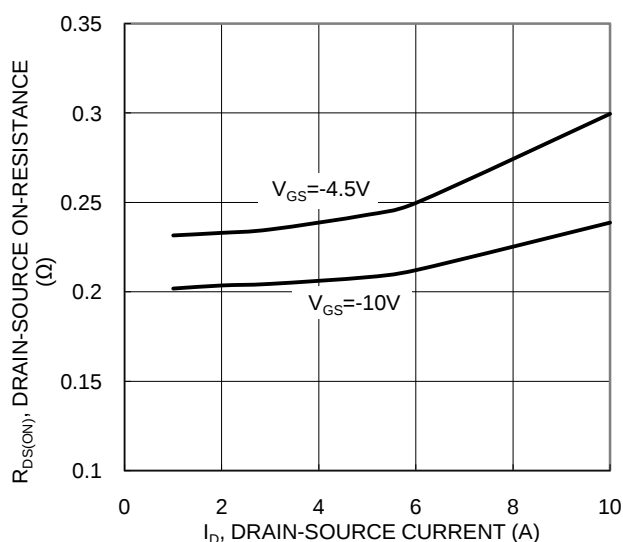


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

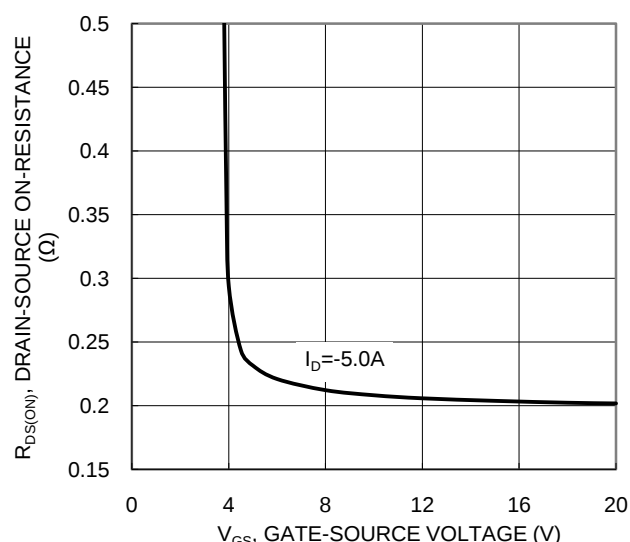


Figure 4. Typical Transfer Characteristic

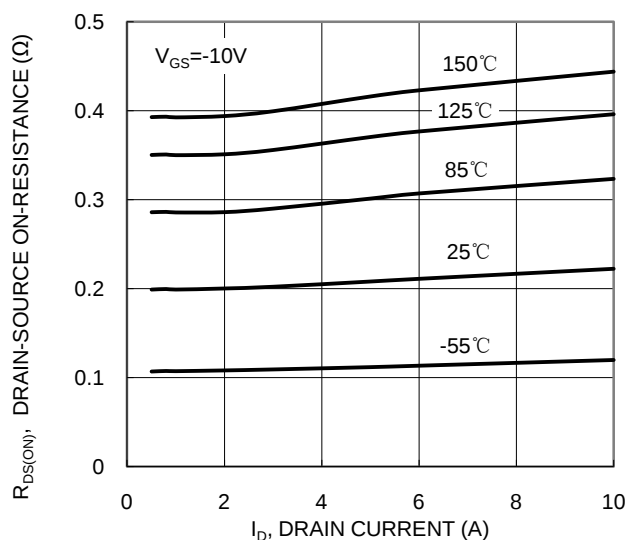


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

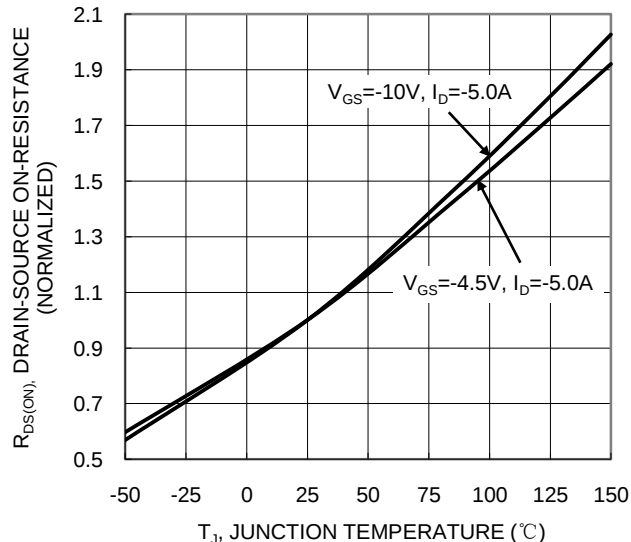
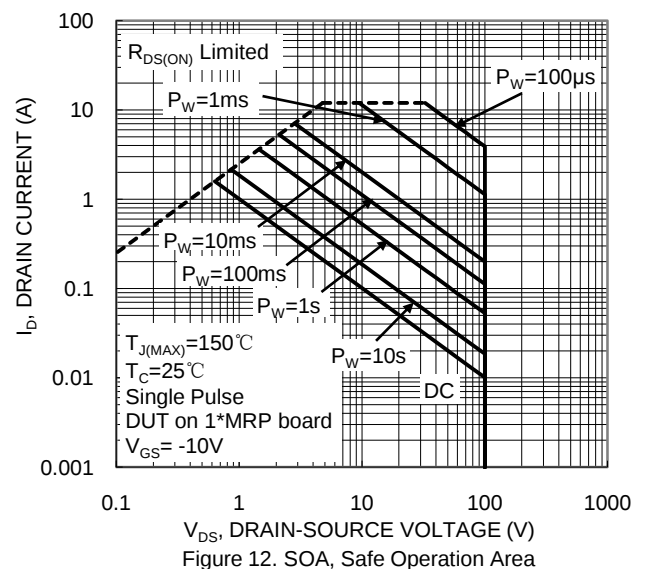
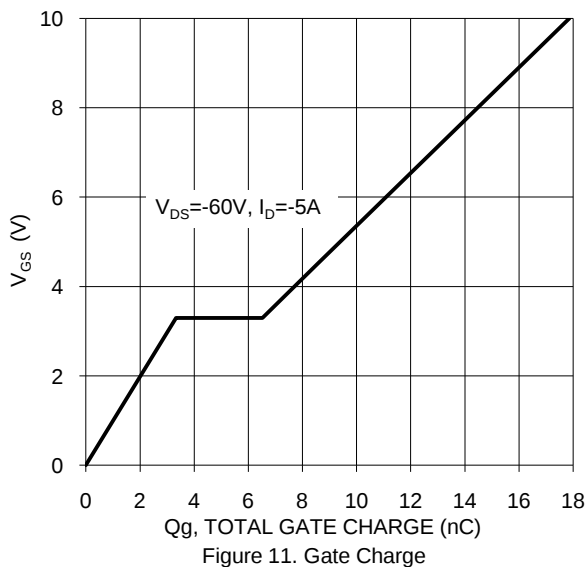
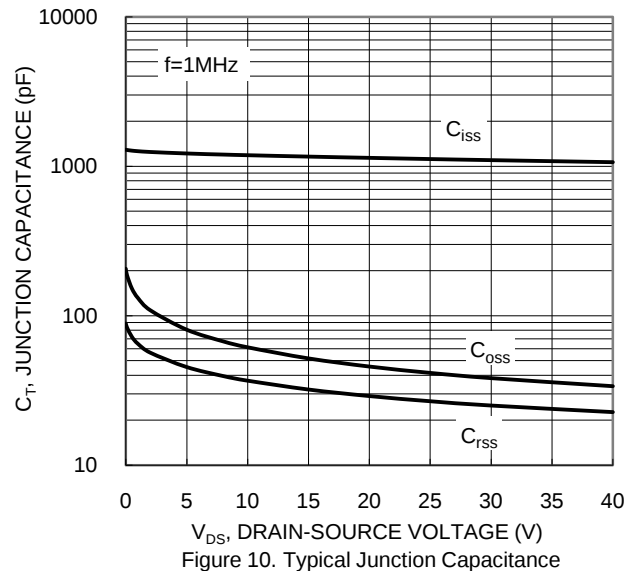
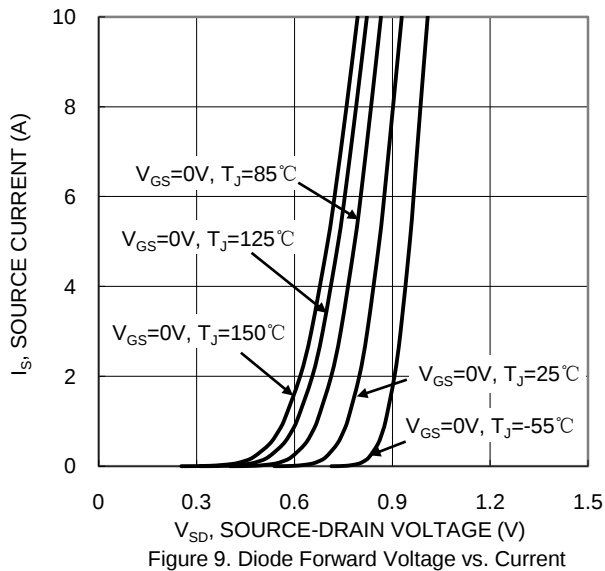
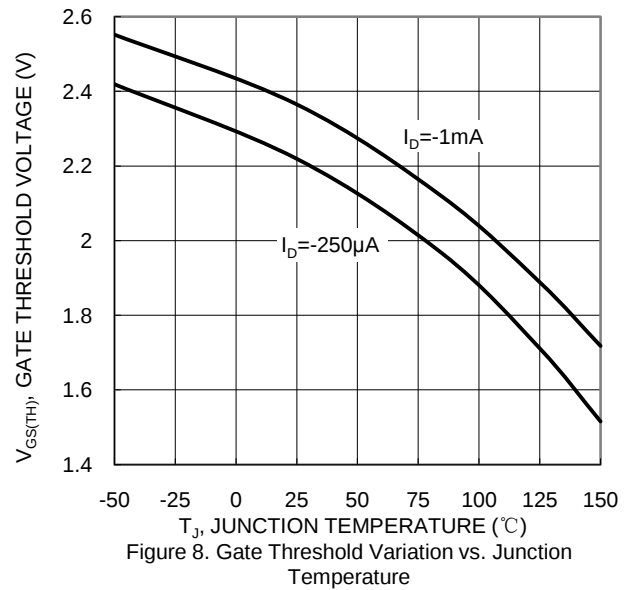
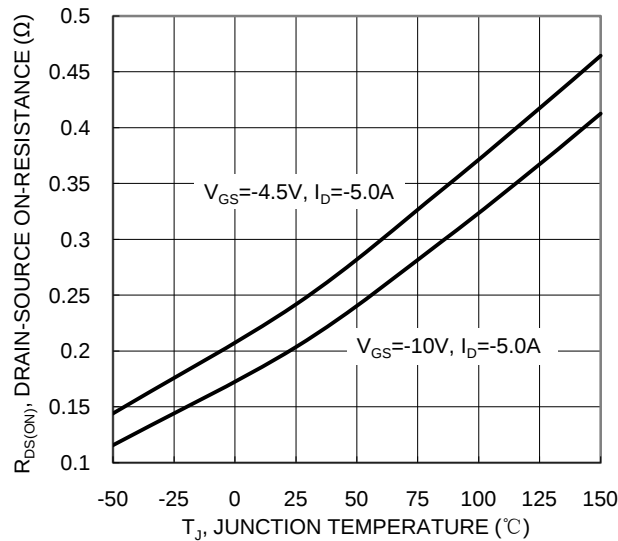


Figure 6. On-Resistance Variation with Junction Temperature



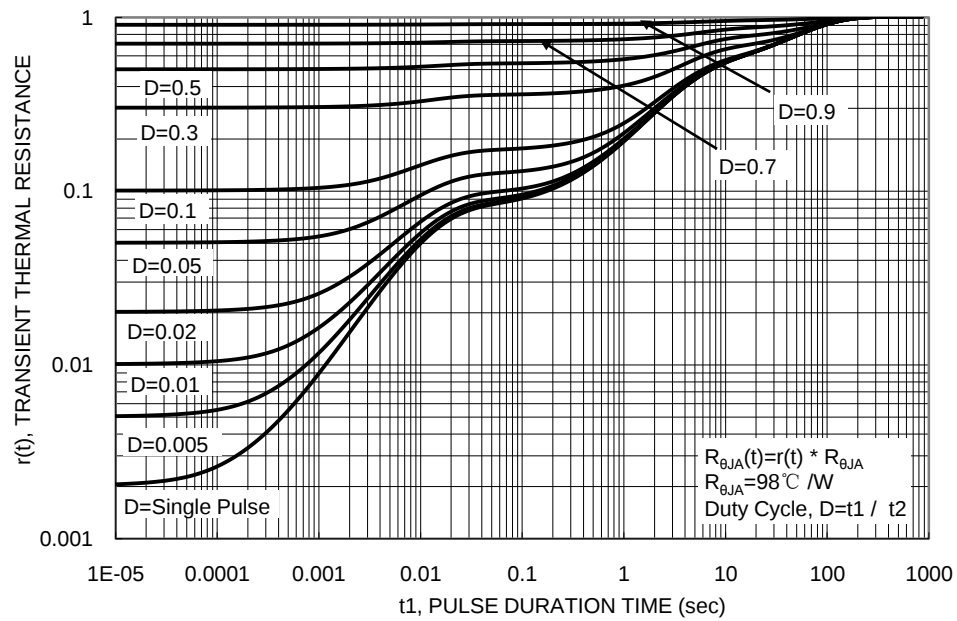
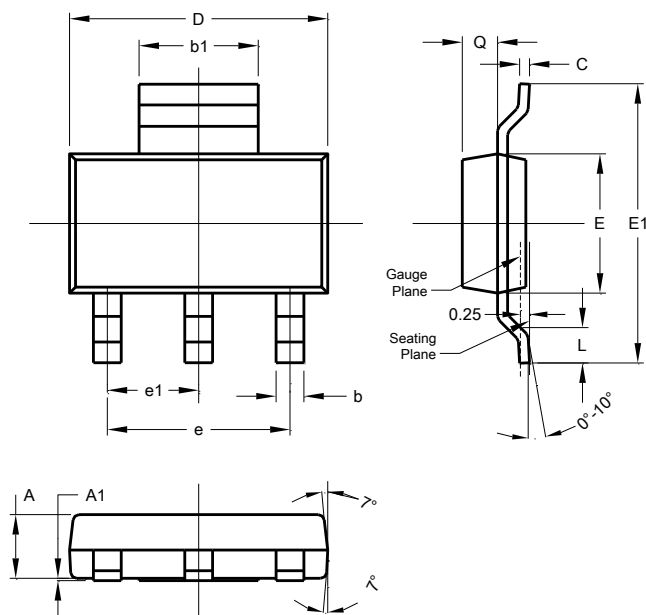


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

**SOT223**

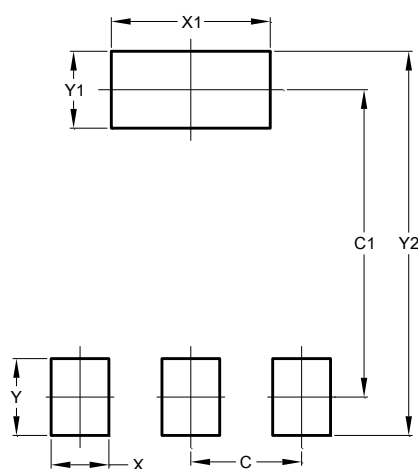


| SOT223               |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A                    | 1.55  | 1.65 | 1.60 |
| A1                   | 0.010 | 0.15 | 0.05 |
| b                    | 0.60  | 0.80 | 0.70 |
| b1                   | 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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