

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ max}$       | $I_D \text{ max}$<br>$T_A = +25^\circ\text{C}$ |
|---------------|--------------------------------|--|
| 100V          | 110mΩ @ $V_{GS} = 10\text{V}$  | 3.6A   |
|               | 122mΩ @ $V_{GS} = 6.0\text{V}$ | 3.4A   |

## Description

This new generation MOSFET is designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.


## Applications

- DC-DC Converters
- Power Management Functions

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

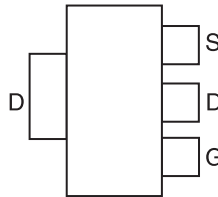
## Mechanical Data

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

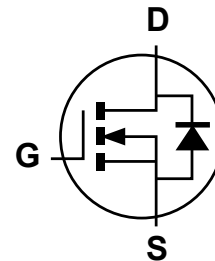
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

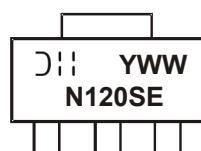
## Ordering Information (Note 4)

| Part Number    | Qualification | Case   | Packaging         |
|----------------|---------------|--------|-------------------|
| DMN10H120SE-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](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

SOT223



D = Manufacturer's Marking  
 N120SE = Marking Code  
 YWW = Date Code Marking  
 Y or  $\overline{Y}$  = Year (ex: 5 = 2015)  
 WW = Week (01 - 53)

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

| Characteristic  |              |  | Symbol           | Value      | Units |
|---|--------------|--|------------------|------------|-------|
| Drain-Source Voltage                                    |              |  | V <sub>DSS</sub> | 100        | V     |
| Gate-Source Voltage                                     |              |  | V <sub>GSS</sub> | ±20        | V     |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 3.6<br>2.9 | A     |
| Pulsed Drain Current (10μs pulse, duty cycle ≤ 1%)      |              |  | I <sub>DM</sub>  | 16         | A     |
| Maximum Body Diode Continuous Current (Note 6)          |              |  | I <sub>S</sub>   | 2.5        | A     |

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

| Characteristic                          |          | Symbol                            | Value       | Units |
|---|----------|-----------------------------------|-------------|-------|
| Total Power Dissipation                 | (Note 5) | P <sub>D</sub>                    | 1.3         | W     |
|   | (Note 6) |                                   | 2.1         |       |
| Thermal Resistance, Junction to Ambient | (Note 5) | R <sub>θJA</sub>                  | 94          | °C/W  |
|   | (Note 6) |                                   | 58          |       |
| Thermal Resistance, Junction to Case    | (Note 6) | R <sub>θJC</sub>                  | 8.2         |       |
| 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>    | —   | —   | 1.0  | µA   | V <sub>DS</sub> = 80V, V <sub>GS</sub> = 0V  |
| Gate-Body 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> | 1.5 | 2.6 | 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> | —   | 77  | 110  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 3.3A   |
|  |                     | —   | 84  | 122  |      | V <sub>GS</sub> = 6.0V, I <sub>D</sub> = 3.0A  |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.8 | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 3.2A  |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>    |                     |     |     |      |      |  |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 549 | —    | pF   | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V, f = 1.0MHz                                    |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 41  | —    |      |  |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 19  | —    |      |  |
| Gate Resistance                            | R <sub>g</sub>      | —   | 1.6 | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz                                     |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 10  | —    | nC   | V <sub>DS</sub> = 50V, I <sub>D</sub> = 3.3A   |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 5.2 | —    |      |  |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 2.3 | —    |      |  |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 2.6 | —    |      |  |
| Turn-On Delay Time                         | t <sub>D(on)</sub>  | —   | 3.8 | —    | nS   | V <sub>DD</sub> = 50V, V <sub>GS</sub> = 10V, R <sub>G</sub> = 6.0Ω, I <sub>D</sub> = 3.3A |
| Turn-On Rise Time                          | t <sub>r</sub>      | —   | 1.8 | —    |      |  |
| Turn-Off Delay Time                        | t <sub>D(off)</sub> | —   | 11  | —    |      |  |
| Turn-Off Fall Time                         | t <sub>f</sub>      | —   | 2.5 | —    |      |  |
| Reverse Recovery Time                      | t <sub>rr</sub>     | —   | 21  | —    | nS   | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.1A, di/dt = 100A/µs                               |
| Reverse Recovery Charge                    | Q <sub>rr</sub>     | —   | 17  | —    | nC   |  |

- Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.  
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.  
7. Short duration pulse test used to minimize self-heating effect.  
8. Guaranteed by design. Not subject to product testing.

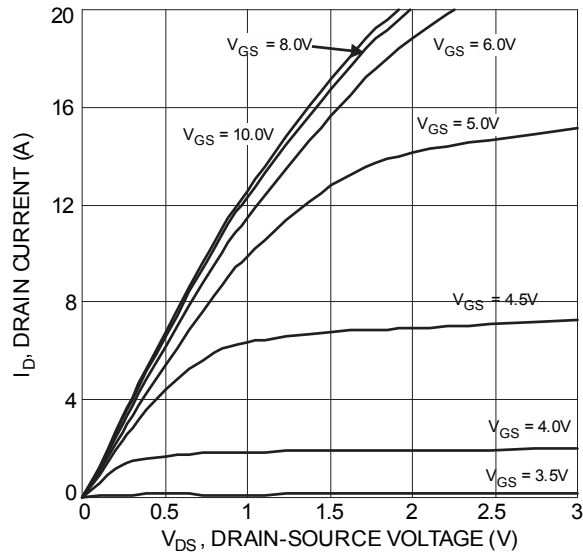


Figure 1 Typical Output Characteristics

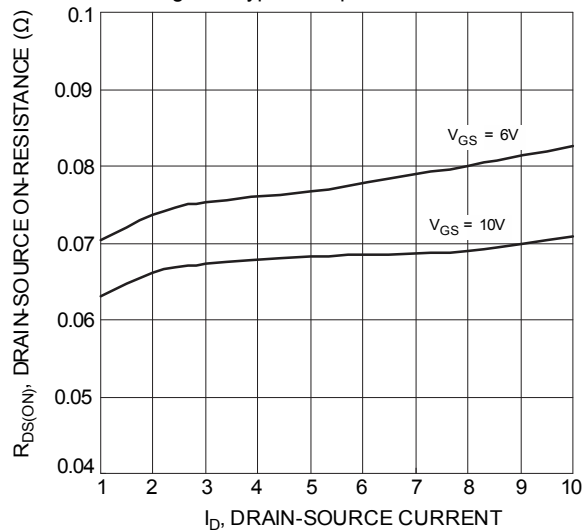


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

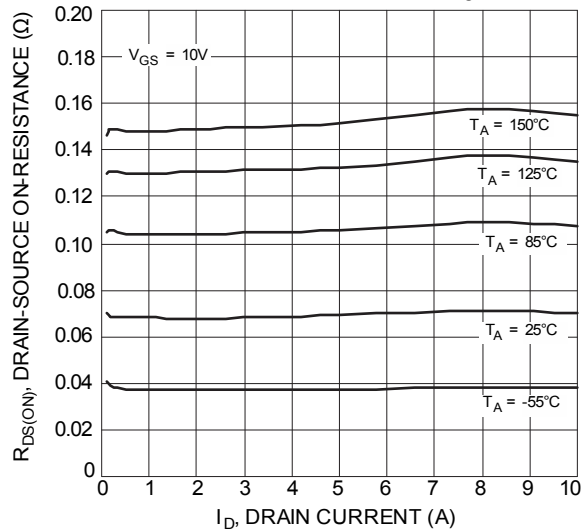


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

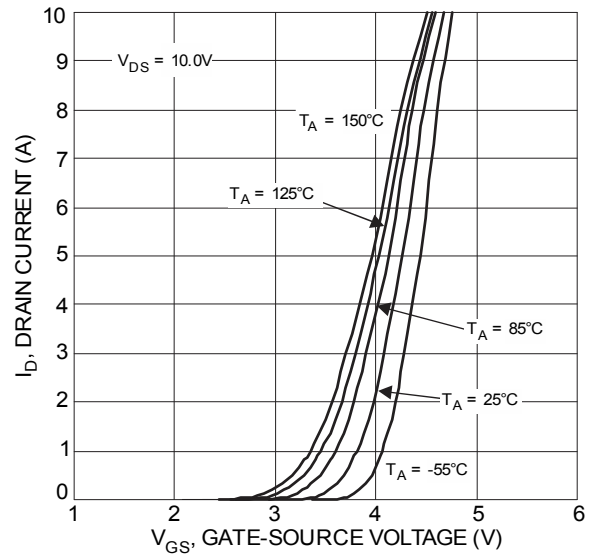


Figure 2 Typical Transfer Characteristics

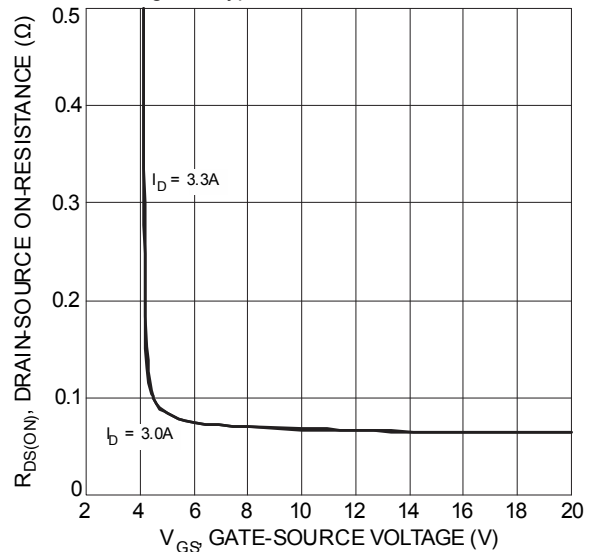


Figure 4 Typical Transfer Characteristics

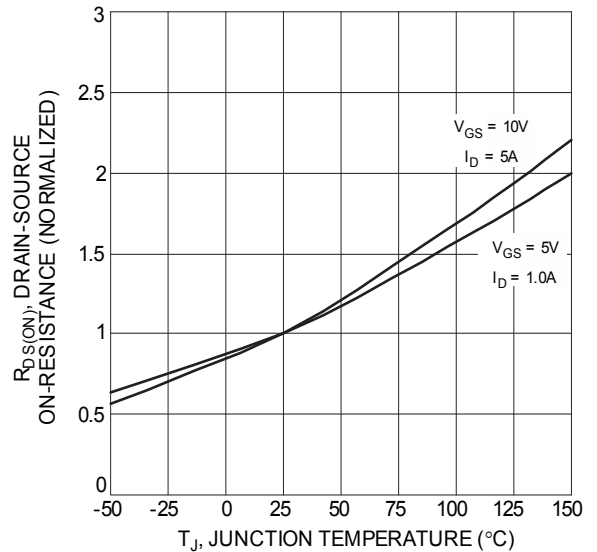
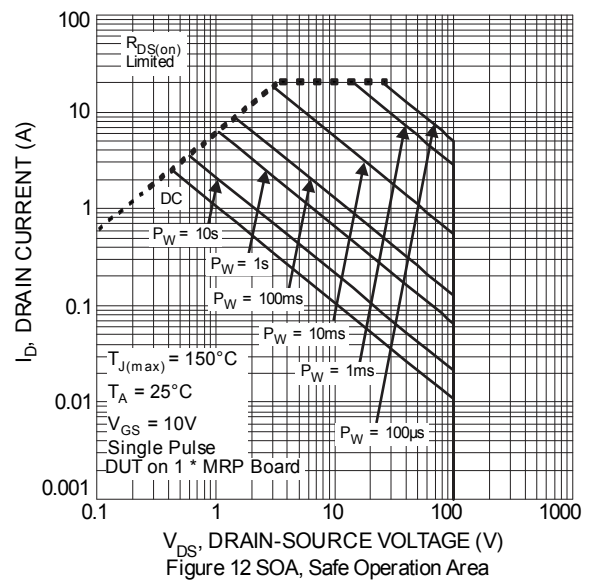
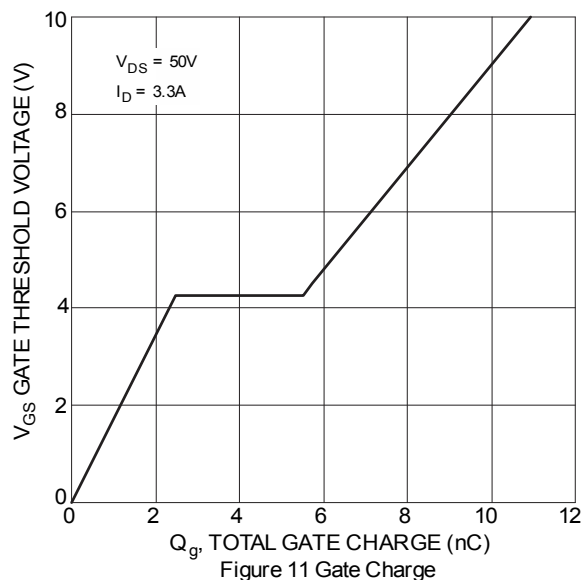
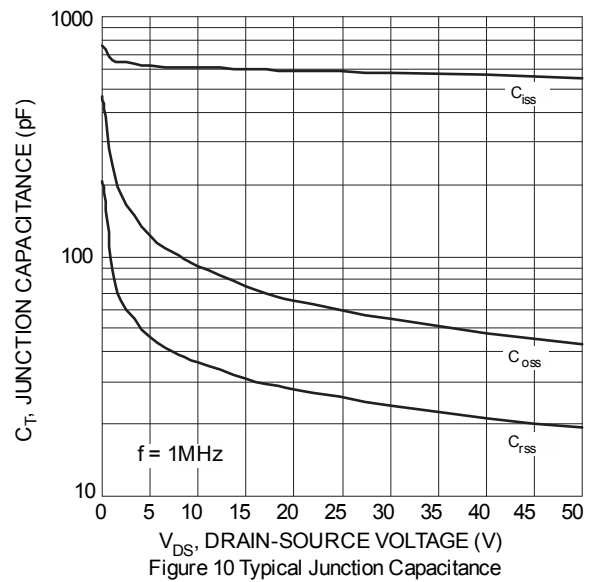
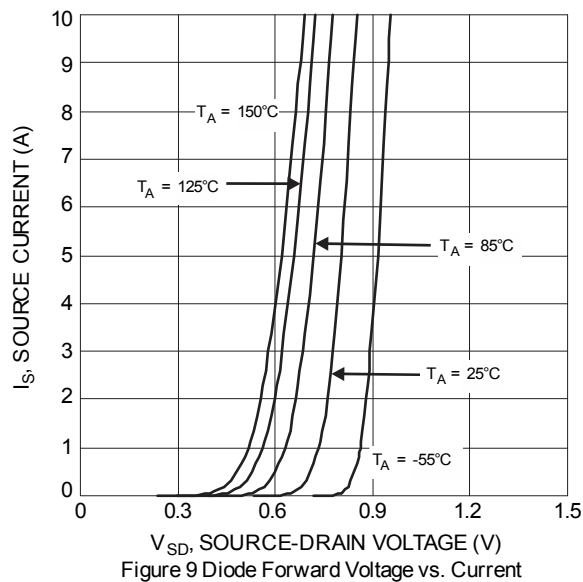
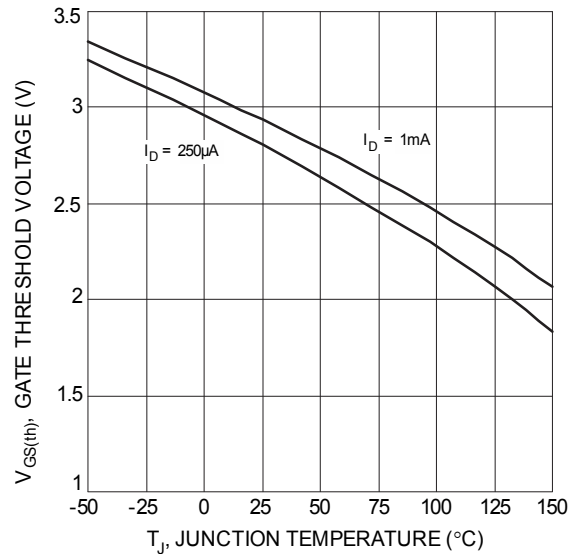
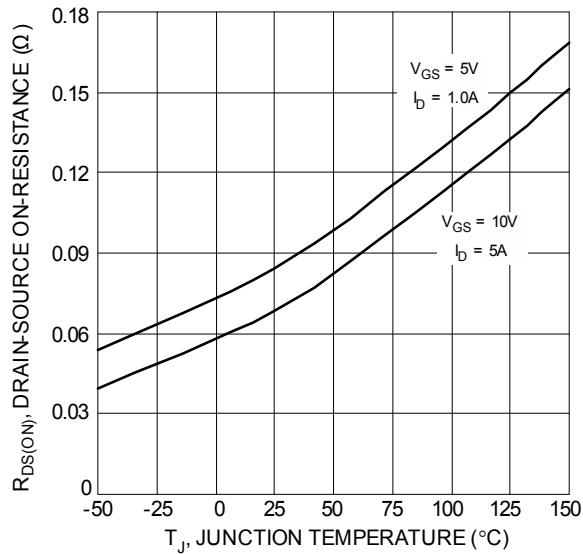
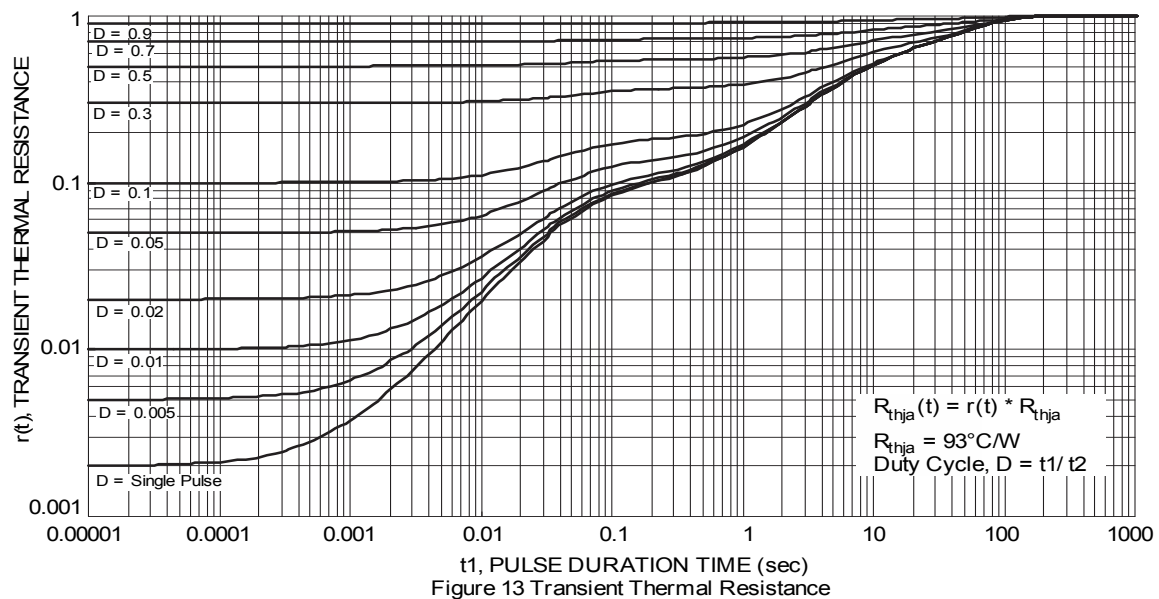


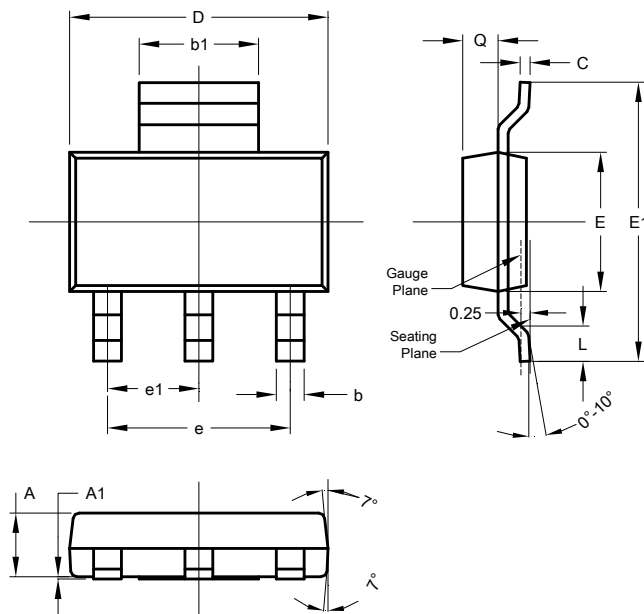
Figure 6 On-Resistance Variation with Temperature





## Package Outline Dimensions & Suggested Pad Layout

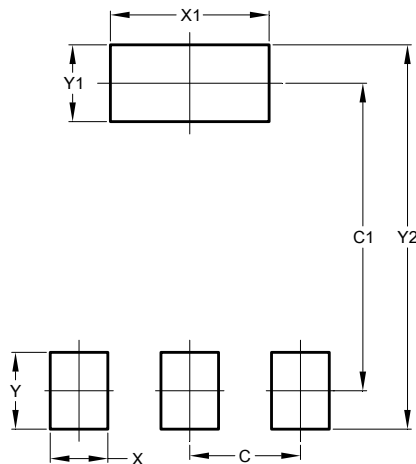
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| 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 AP02001 at <http://www.diodes.com/datasheets/ap02001.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          |
| C2         | 8.00          |

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