

**150V N-CHANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ max}$       | $I_D$<br>$T_A = +25^\circ\text{C}$ |
|---------------|--------------------------------|------------------------------------|
| 150V          | 310mΩ @ $V_{GS} = 10\text{V}$  | 2.0A                               |
|               | 330mΩ @ $V_{GS} = 5.0\text{V}$ | 1.9A                               |

**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**

- Motor Control
- Transformer Driving Switch
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

**Features**

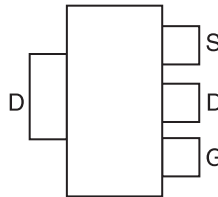
- 100% Unclamped Inductive Switch (UIS) Test in Production
- Fast Switching Speed
- Low On-Resistance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

**Mechanical Data**

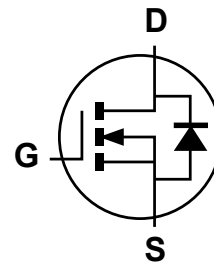
- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.112 grams (Approximate)



Top View



Pin Out - Top View

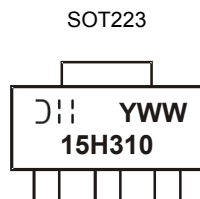


Equivalent Circuit

**Ordering Information** (Note 4)

| Part Number    | Compliance | Case   | Packaging           |
|----------------|------------|--------|---------------------|
| DMN15H310SE-13 | Standard   | SOT223 | 2,500 / 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](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**


DII = Manufacturer's Marking  
 15H310 = Marking Code  
 YWW = Date Code Marking  
 Y or Y = Year (ex: 4 = 2014)  
 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>       | 150   | V     |
| Gate-Source Voltage                                                 | V <sub>GSS</sub>       | ±20   | V     |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V             | T <sub>A</sub> = +25°C | 2.0   | A     |
|                                                                     | T <sub>A</sub> = +70°C | 1.6   | A     |
|                                                                     | T <sub>C</sub> = +25°C | 7.1   | A     |
|                                                                     | T <sub>C</sub> = +70°C | 5.6   | A     |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%)                  | I <sub>DM</sub>        | 10    | A     |
| Maximum Body Diode Continuous Current                               | I <sub>S</sub>         | 2.5   | A     |
| Avalanche Energy (Note 6) L=26mH                                    | E <sub>AS</sub>        | 1.45  | mJ    |
| Avalanche Current (Note 6) L=26mH                                   | I <sub>AS</sub>        | 0.2   | A     |
| Peak Diode Recovery dv/dt (I <sub>SD</sub> ≤ 7.3A, di/dt ≤ 300A/µs) | dv/dt                  | 5     | V/ns  |

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

| Characteristic                                   | Symbol                            | Value       | Units |
|--------------------------------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 1.9         | W     |
|                                                  |                                   | 1.2         |       |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 64          | °C/W  |
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 23.5        | W     |
| Thermal Resistance, Junction to Case (Note 5)    | R <sub>θJC</sub>                  | 5.3         | °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>   | 150 | —    | —    | 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> = 120V, 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   | 2.2  | 3    | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                                   |
| Static Drain-Source On-Resistance          | R <sub>DS(on)</sub> | —   | 178  | 310  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.5A                                                 |
|                                            |                     | —   | 190  | 330  |      | V <sub>GS</sub> = 5.0V, I <sub>D</sub> = 1.0A                                                |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.76 | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.7A                                                  |
| <b>DYNAMIC CHARACTERISTICS (Note 6)</b>    |                     |     |      |      |      |                                                                                              |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 405  | —    | pF   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                    |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 40   | —    |      |                                                                                              |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 20   | —    |      |                                                                                              |
| Gate Resistance                            | R <sub>G</sub>      | —   | 2.88 | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz                                       |
| Total Gate Charge (V <sub>GS</sub> = 5.0V) | Q <sub>g</sub>      | —   | 4.6  | —    | nC   | V <sub>DS</sub> = 80V, I <sub>D</sub> = 7.3A                                                 |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 8.7  | —    |      |                                                                                              |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 1.7  | —    |      |                                                                                              |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 1.8  | —    |      |                                                                                              |
| Turn-On Delay Time                         | t <sub>D(on)</sub>  | —   | 3.5  | —    | nS   | V <sub>DD</sub> = 50V, V <sub>GS</sub> = 10V,<br>R <sub>G</sub> = 25Ω, I <sub>D</sub> = 7.3A |
| Turn-On Rise Time                          | t <sub>r</sub>      | —   | 7.8  | —    |      |                                                                                              |
| Turn-Off Delay Time                        | t <sub>D(off)</sub> | —   | 22   | —    |      |                                                                                              |
| Turn-Off Fall Time                         | t <sub>f</sub>      | —   | 11   | —    |      |                                                                                              |
| Reverse Recovery Time                      | t <sub>rr</sub>     | —   | 38   | —    | ns   | I <sub>F</sub> = 7.3A, di/dt = 100A/µs                                                       |
| Reverse Recovery Charge                    | Q <sub>rr</sub>     | —   | 53   | —    | nC   | I <sub>F</sub> = 7.3A, di/dt = 100A/µs                                                       |

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

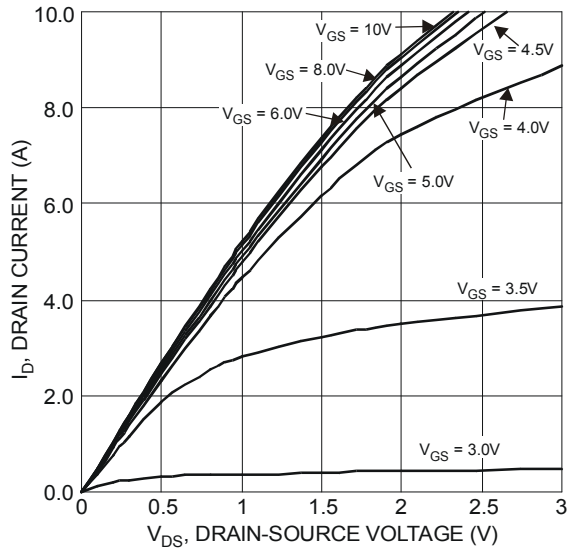


Figure 1 Typical Output Characteristics

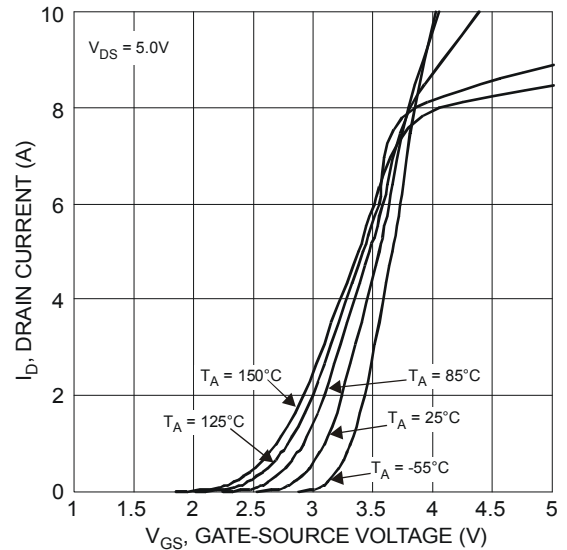


Figure 2 Typical Transfer Characteristics

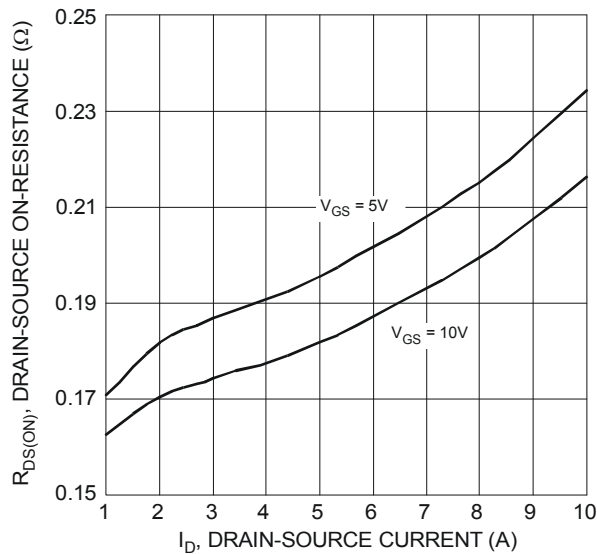


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

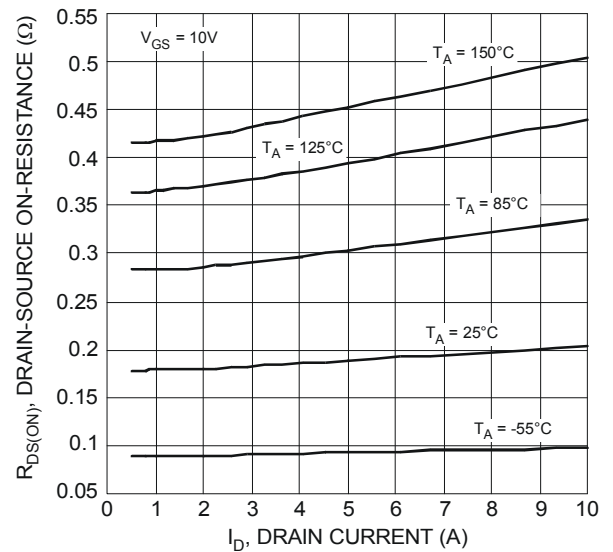


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

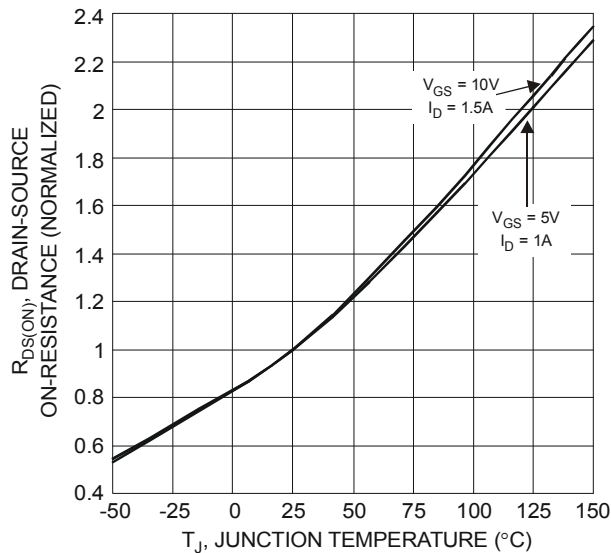


Figure 5 On-Resistance Variation with Temperature

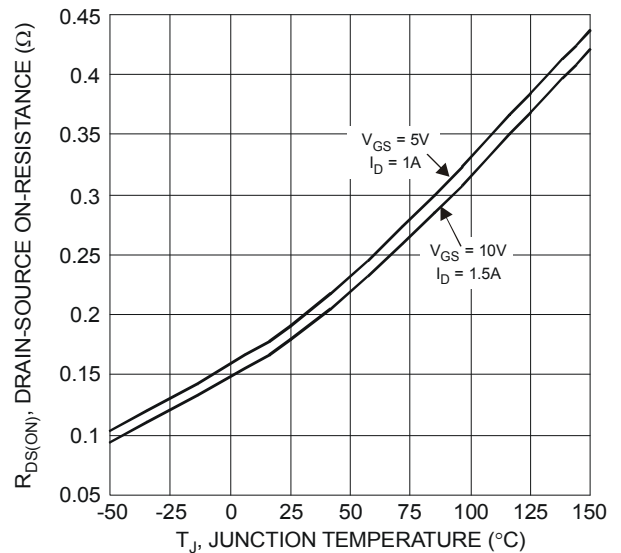


Figure 6 On-Resistance Variation with Temperature

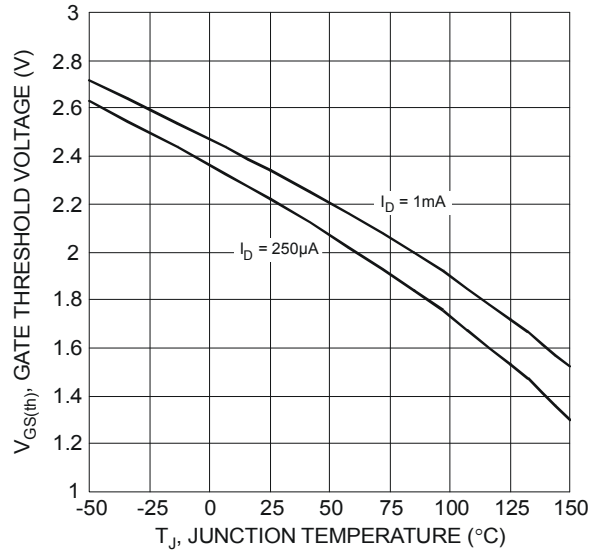


Figure 7 Gate Threshold Variation vs. Ambient Temperature

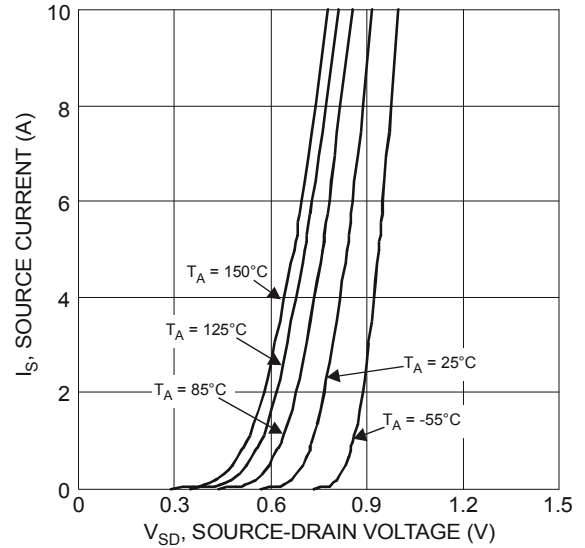


Figure 8 Diode Forward Voltage vs. Current

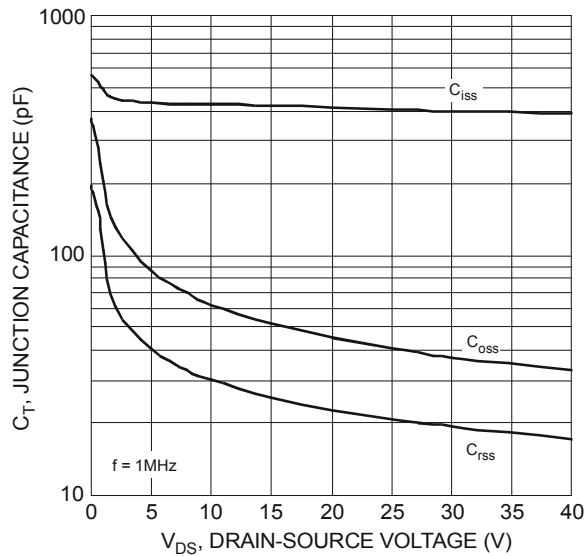


Figure 9 Typical Junction Capacitance

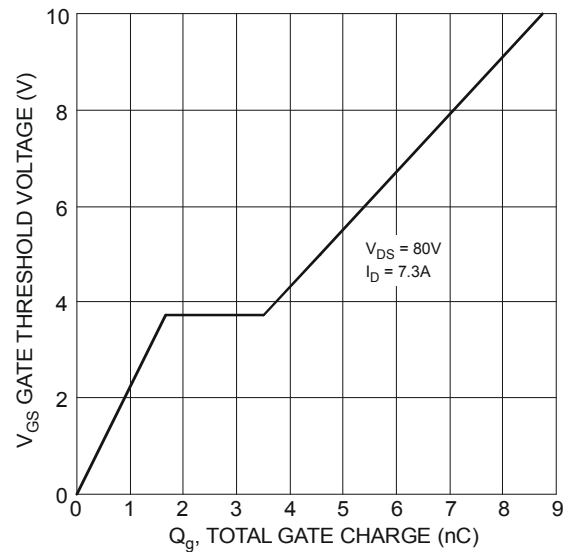


Figure 10 Gate Charge

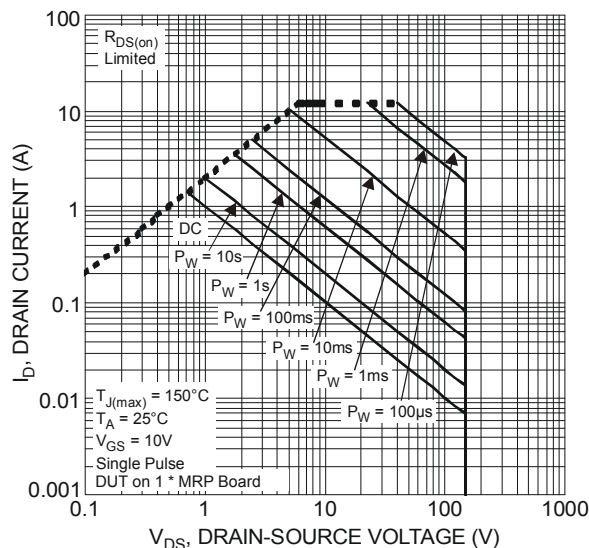
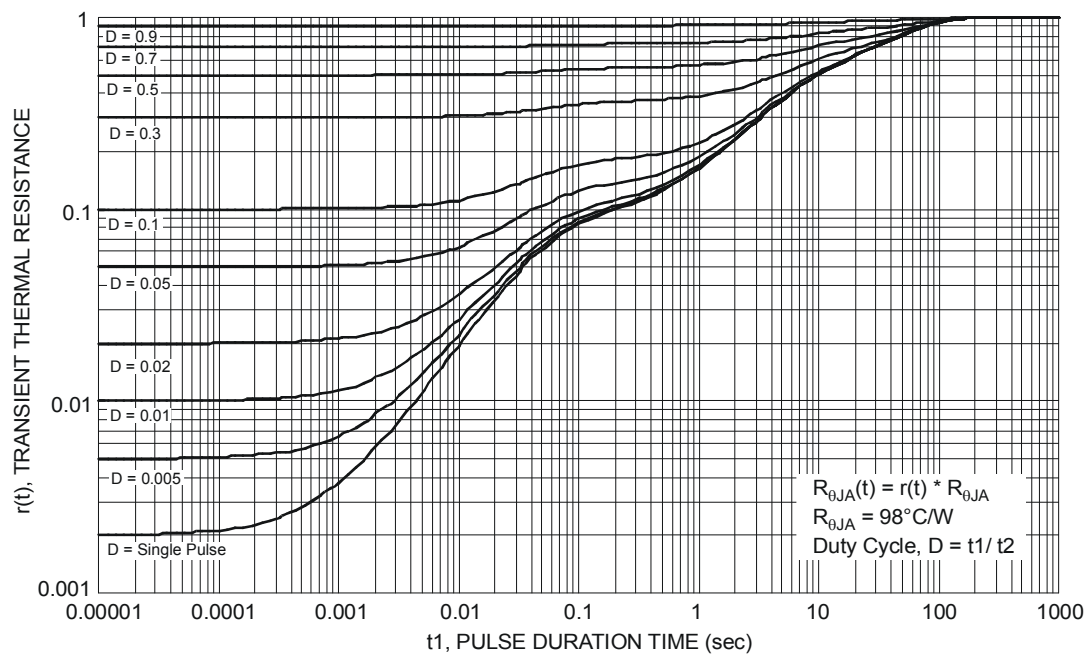
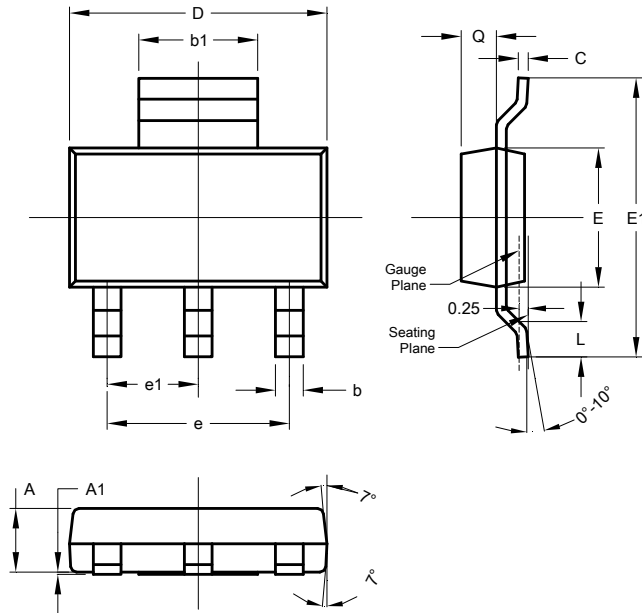


Figure 11 SOA, Safe Operation Area



## Package Outline Dimensions

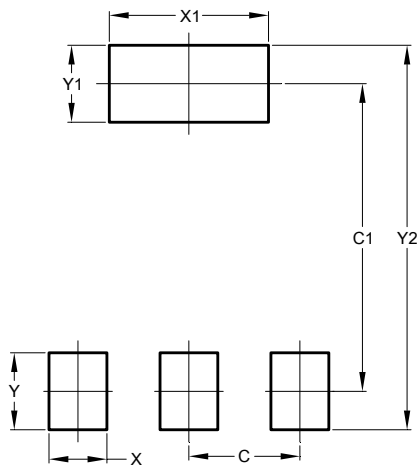
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| 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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