

### Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on) max}$        | $I_D$<br>$T_A = +25^\circ C$ |
|---------------|-------------------------|------------------------------|
| 100V          | 220mΩ @ $V_{GS} = 10V$  | 2.3A                         |
|               | 250mΩ @ $V_{GS} = 4.5V$ | 2.1A                         |

### 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

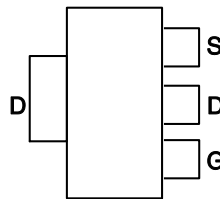
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

### Mechanical Data

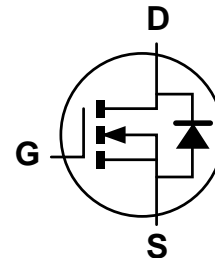
- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method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



Top View



Pin Out - Top View



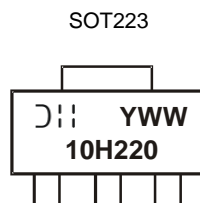
Equivalent Circuit

### Ordering Information (Note 4)

| Part Number    | Compliance | Case   | Packaging         |
|----------------|------------|--------|-------------------|
| DMN10H220LE-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



D||| = Manufacturer's Marking  
 10H220 = Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: 3 = 2013)  
 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 5) V <sub>GS</sub> = 10V | T <sub>A</sub> = +25°C | 2.3   | A     |
|   | T <sub>A</sub> = +70°C | 1.8   | A     |
|   | T <sub>C</sub> = +25°C | 6.2   | A     |
|   | T <sub>C</sub> = +70°C | 4.9   | A     |
| Maximum Continuous Body Diode Forward Current (Note 5)  | I <sub>S</sub>         | 1.5   | A     |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%)      | I <sub>DM</sub>        | 8     | 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>                    | T <sub>A</sub> = +25°C | 1.8   |
|  |                                   | T <sub>A</sub> = +70°C | 1.1   |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 69                     | °C/W  |
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 14                     | W     |
| Thermal Resistance, Junction to Case (Note 5)    | R <sub>θJC</sub>                  | 8.7                    | °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 6)</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> = 100V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —   | ±100 | nA   | V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 6)</b>         |                     |     |     |      |      |  |
| Gate Threshold Voltage                     | V <sub>GS(th)</sub> | 1   | 1.7 | 2.5  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                                     |
| Static Drain-Source On-Resistance          | R <sub>DS(on)</sub> | —   | 155 | 220  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.6A   |
|  |                     | —   | 190 | 250  |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 1.3A  |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.8 | 1.5  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.1A  |
| <b>DYNAMIC CHARACTERISTICS (Note 7)</b>    |                     |     |     |      |      |  |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 401 | —    | pF   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                      |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 22  | —    |      |  |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 17  | —    |      |  |
| Gate Resistnace                            | R <sub>g</sub>      | —   | 2.1 | —    | 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>      | —   | 4.1 | —    | nC   | V <sub>DS</sub> = 50V, I <sub>D</sub> = 1.6A   |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 8.3 | —    |      |  |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 1.5 | —    |      |  |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 2   | —    |      |  |
| Turn-On Delay Time                         | t <sub>D(on)</sub>  | —   | 6.8 | —    | ns   | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 4.5V,<br>R <sub>G</sub> = 6.8Ω, I <sub>D</sub> = 1.0A |
| Turn-On Rise Time                          | t <sub>r</sub>      | —   | 8.2 | —    |      |  |
| Turn-Off Delay Time                        | t <sub>D(off)</sub> | —   | 7.9 | —    |      |  |
| Turn-Off Fall Time                         | t <sub>f</sub>      | —   | 3.6 | —    |      |  |
| Reverse Recovery Time                      | t <sub>rr</sub>     | —   | 17  | —    | ns   | I <sub>S</sub> = 1.1A, di/dt = 100A/µs   |
| Reverse Recovery Charge                    | Q <sub>rr</sub>     | —   | 9.8 | —    | nC   |  |

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

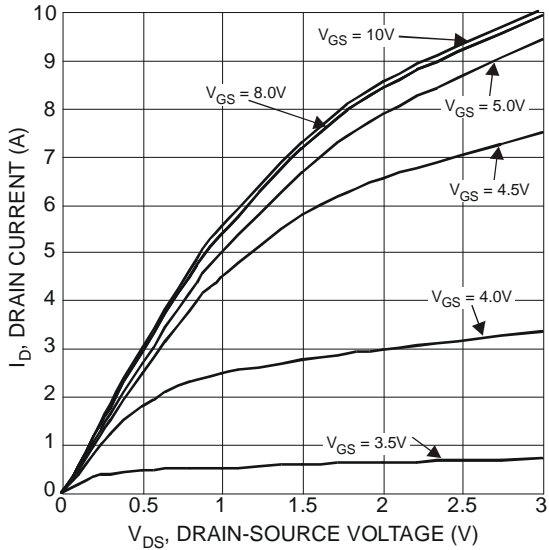


Figure 1 Typical Output Characteristic

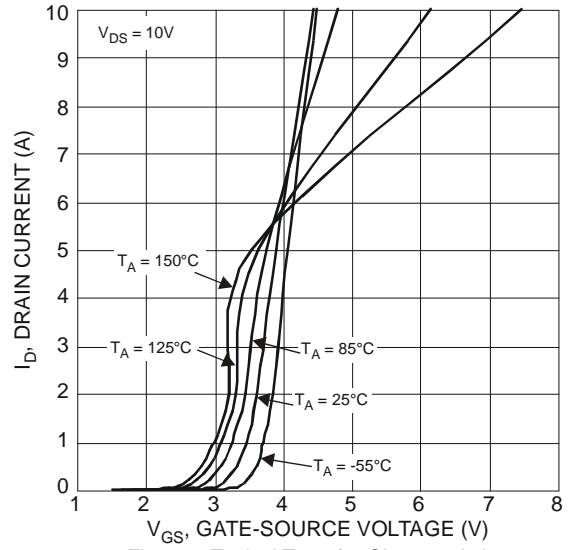


Figure 2 Typical Transfer Characteristics

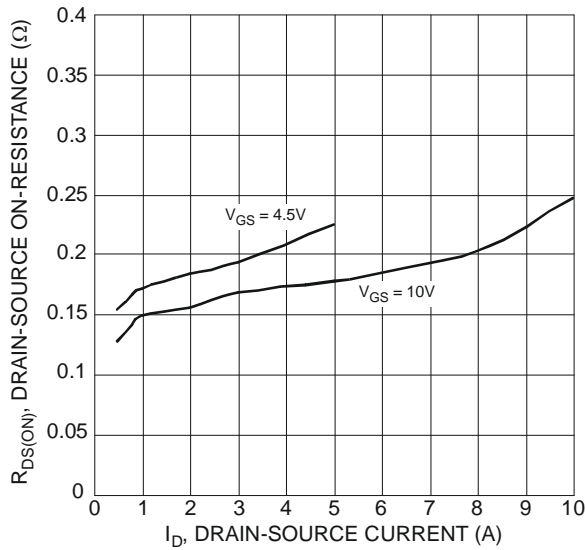


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

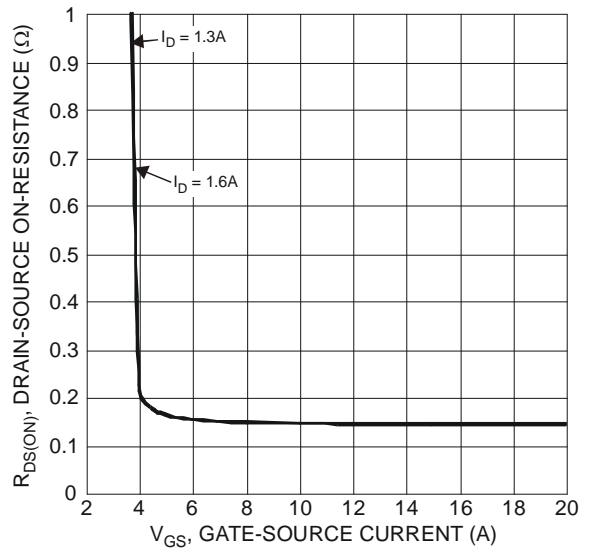


Figure 4 Typical Transfer Characteristic

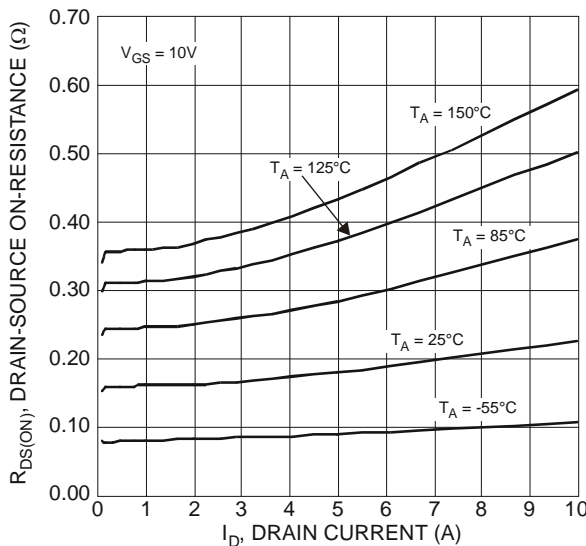


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

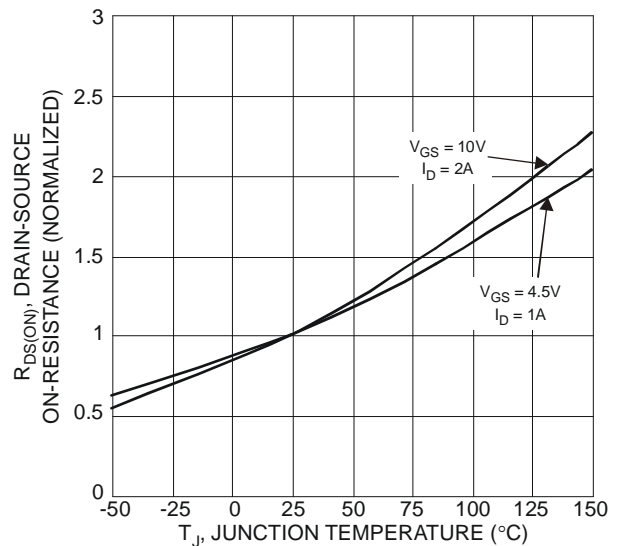


Figure 6 On-Resistance Variation with Temperature

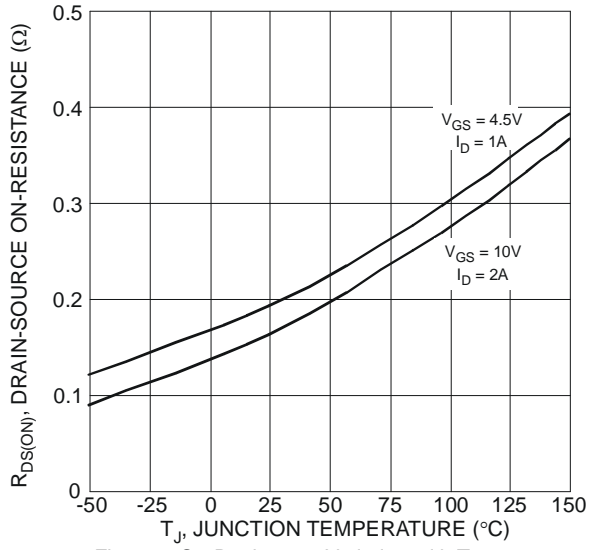


Figure 7 On-Resistance Variation with Temperature

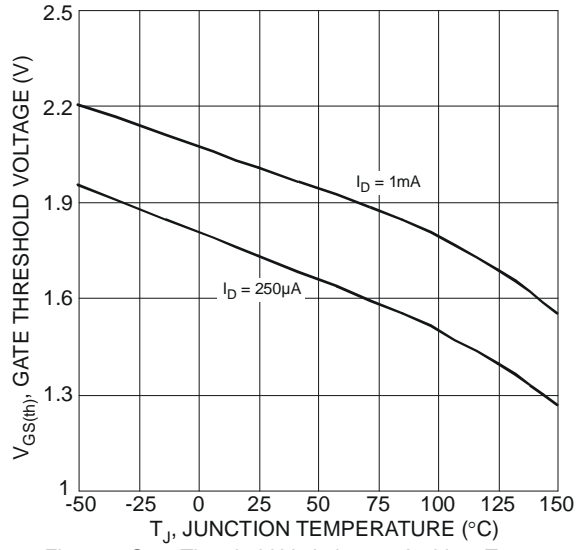


Figure 8 Gate Threshold Variation vs. Ambient Temperature

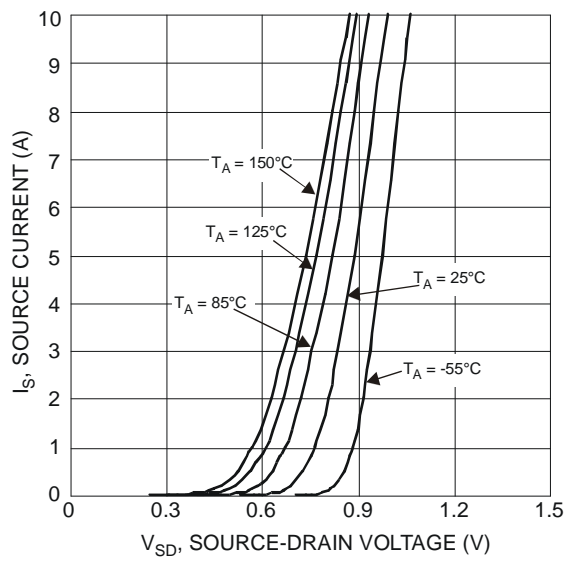


Figure 9 Diode Forward Voltage vs. Current

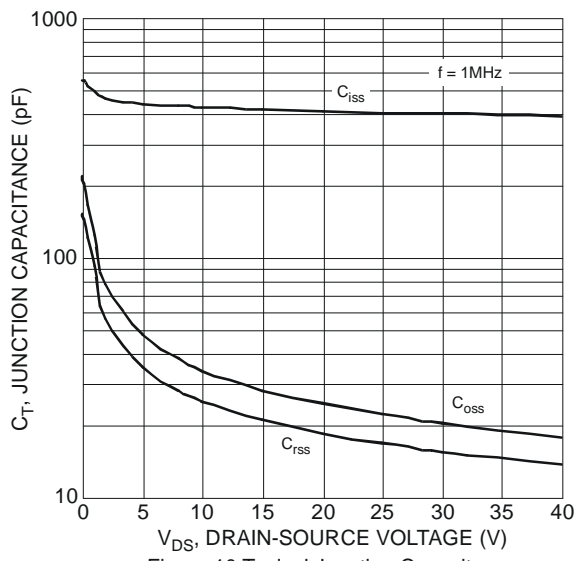


Figure 10 Typical Junction Capacitance

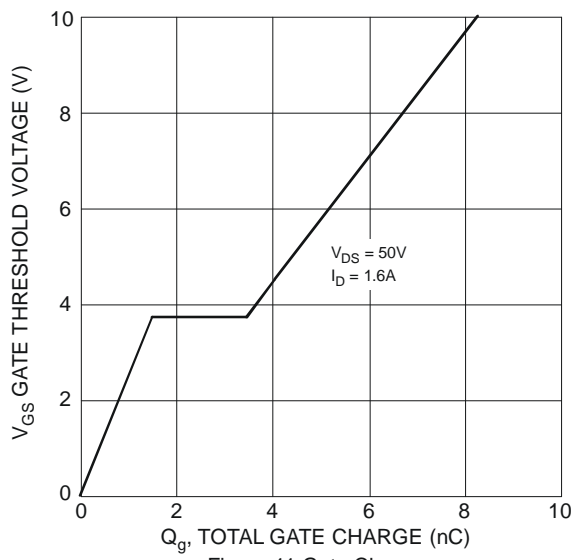


Figure 11 Gate Charge

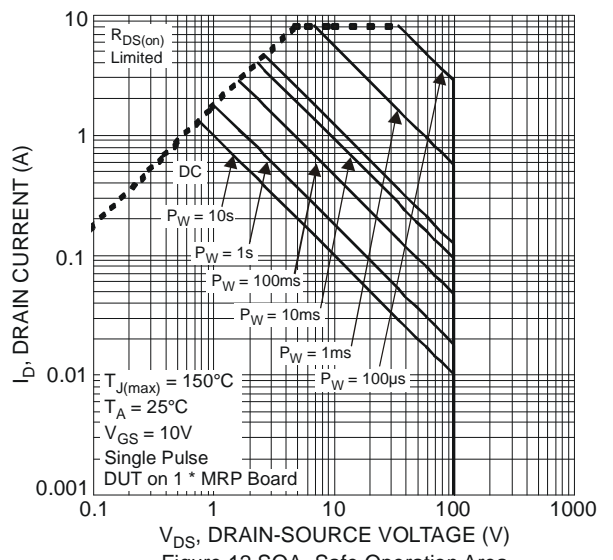
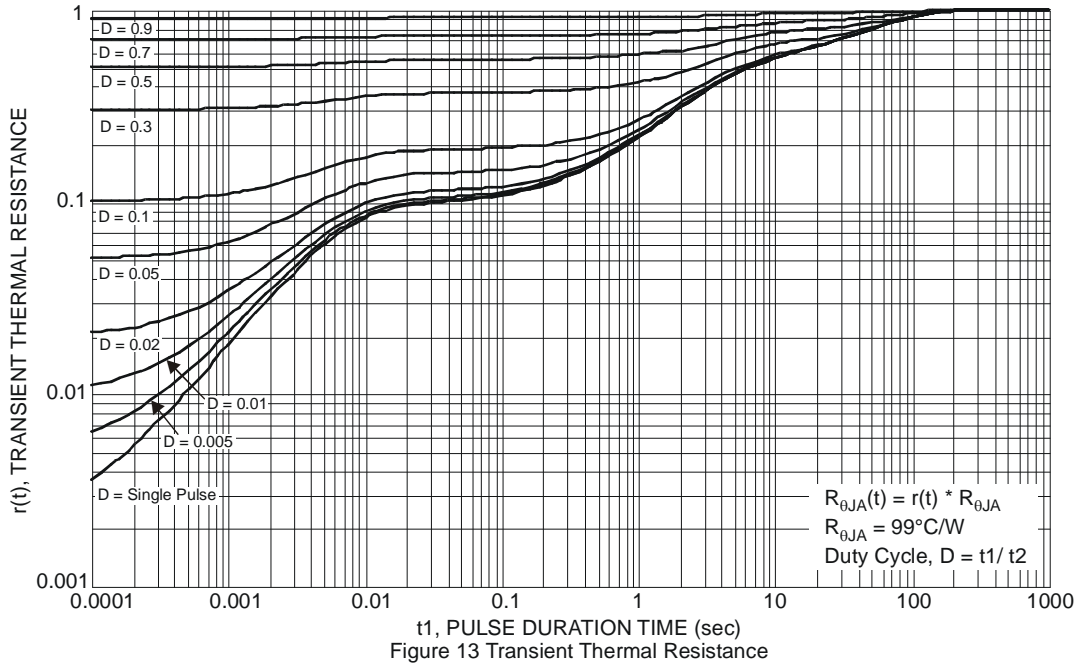
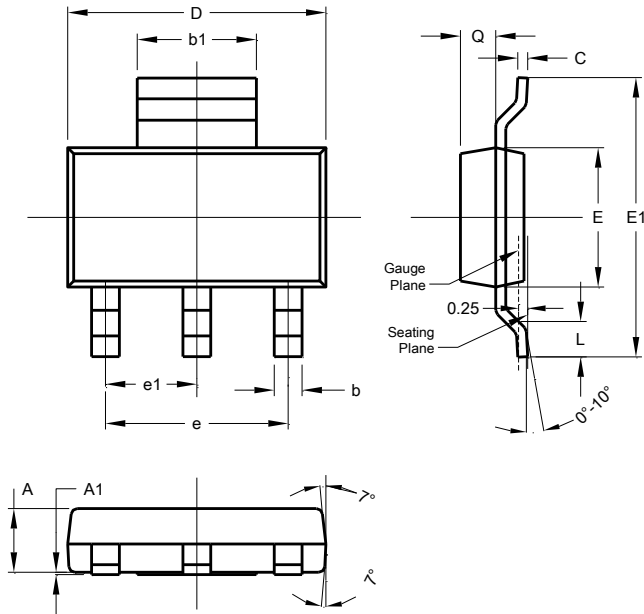


Figure 12 SOA, Safe Operation Area



**Package Outline Dimensions**

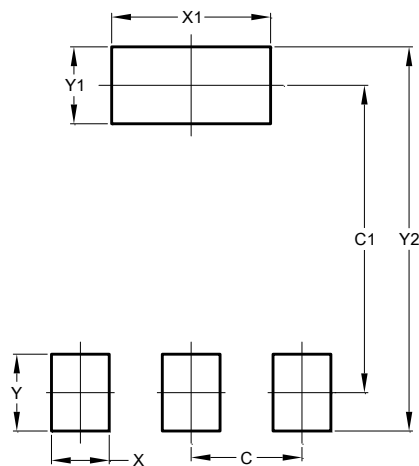
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| 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          |
| Y2         | 8.00          |

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