

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max        | I <sub>D</sub><br>T <sub>A</sub> = +25°C |
|-------------------|--------------------------------|------------------------------------------|
| 60V               | 69mΩ @ V <sub>GS</sub> = 10V   | 4.3A                                     |
|                   | 100mΩ @ V <sub>GS</sub> = 4.5V | 3.5A                                     |

## Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, making it ideal for high efficiency power management applications.

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

## Features and Benefits

- 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)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

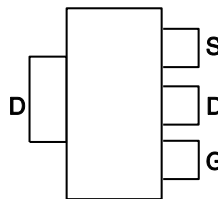
## Mechanical Data

- 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 208②
- Weight: 0.112 grams (Approximate)

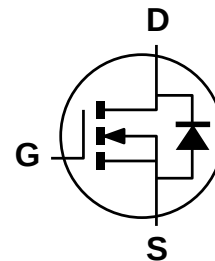
SOT223



Top View



Pin Out - Top View



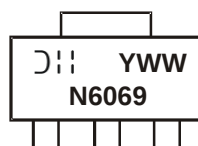
Equivalent Circuit

## Ordering Information (Note 4)

| Part Number  | Case   | Packaging           |
|--------------|--------|---------------------|
| DMN6069SE-13 | SOT223 | 2,500 / Tape & Reel |

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



DII = Manufacturer's Marking  
 N6069 = Marking Code  
 YWW = Date Code Marking  
 Y or Y = Year (ex: 1 = 2021)  
 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>       | 60    | V    |
| Gate-Source Voltage                                     | V <sub>GSS</sub>       | ±20   | V    |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V | T <sub>A</sub> = +25°C | 4.3   | A    |
|                                                         | T <sub>A</sub> = +70°C | 3.3   | A    |
|                                                         | T <sub>C</sub> = +25°C | 10    | A    |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)      | I <sub>DM</sub>        | 25    | A    |
| Maximum Body Diode Continuous Current                   | I <sub>S</sub>         | 4.3   | A    |

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

| Characteristic                                   | Symbol                            | Value       | Unit |
|--------------------------------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 6)                 | P <sub>D</sub>                    | 2.2         | W    |
|                                                  |                                   | 1.4         |      |
| Thermal Resistance, Junction to Ambient (Note 6) | R <sub>θJA</sub>                  | 58          | °C/W |
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 1.2         | W    |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 100         | °C/W |
| Total Power Dissipation (Note 6)                 | P <sub>D</sub>                    | 11          | W    |
| Thermal Resistance, Junction to Case (Note 6)    | R <sub>θJC</sub>                  | 8.9         | °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>   | 60  | —   | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA                                              |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —   | 1    | µA   | V <sub>D</sub> = 60V, V <sub>GS</sub> = 0V                                                |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —   | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>D</sub> = 0V                                               |
| <b>ON CHARACTERISTICS (Note 7)</b>         |                     |     |     |      |      |                                                                                           |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 1   | —   | 3    | V    | V <sub>D</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                                 |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —   | 47  | 69   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 3A                                                |
|                                            |                     | —   | 54  | 100  |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 2.4A                                             |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.8 | 1.1  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 2.5A                                               |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>    |                     |     |     |      |      |                                                                                           |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 825 | —    | pF   | V <sub>D</sub> = 30V, V <sub>GS</sub> = 0V<br>f = 1MHz                                    |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 40  | —    |      |                                                                                           |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 29  | —    |      |                                                                                           |
| Gate Resistance                            | R <sub>G</sub>      | —   | 2.3 | —    | Ω    | V <sub>D</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz                                     |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 7.2 | —    | nC   | V <sub>D</sub> = 30V, I <sub>D</sub> = 12A                                                |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 16  | —    |      |                                                                                           |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 3.2 | —    |      |                                                                                           |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 2.8 | —    |      |                                                                                           |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  | —   | 3.8 | —    | ns   | V <sub>D</sub> = 30V, V <sub>GS</sub> = 10V,<br>R <sub>G</sub> = 6Ω, I <sub>D</sub> = 12A |
| Turn-On Rise Time                          | t <sub>R</sub>      | —   | 6.7 | —    |      |                                                                                           |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> | —   | 16  | —    |      |                                                                                           |
| Turn-Off Fall Time                         | t <sub>F</sub>      | —   | 5.3 | —    |      |                                                                                           |

- 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 thermal vias to bottom layer 1inch square copper plate.  
7. Short duration pulse test used to minimize self-heating effect.  
8. Guaranteed by design. Not subject to product testing.

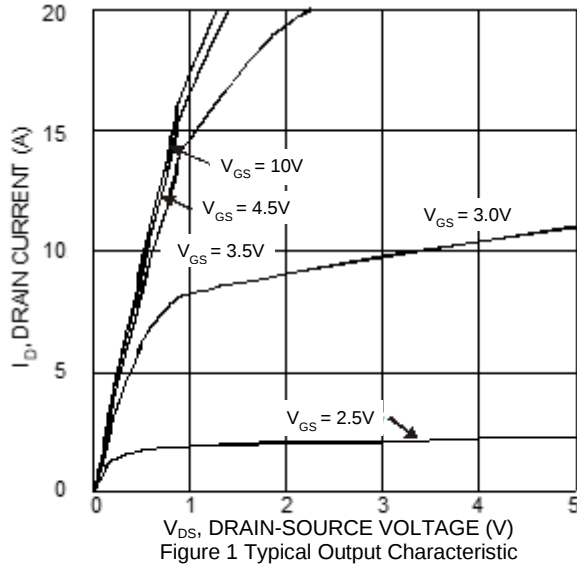


Figure 1 Typical Output Characteristic

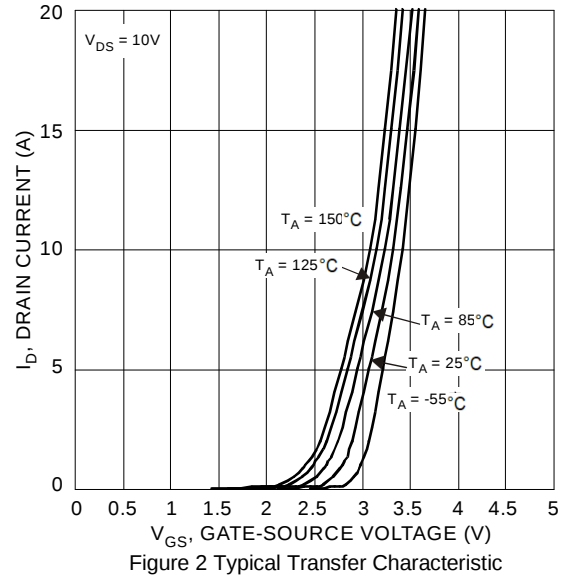


Figure 2 Typical Transfer Characteristic

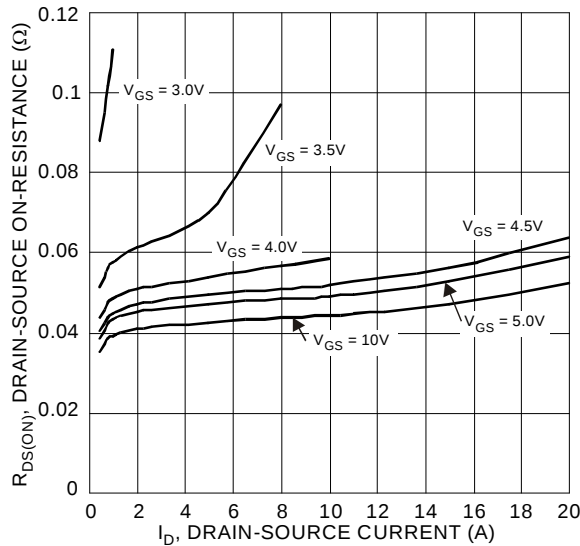


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

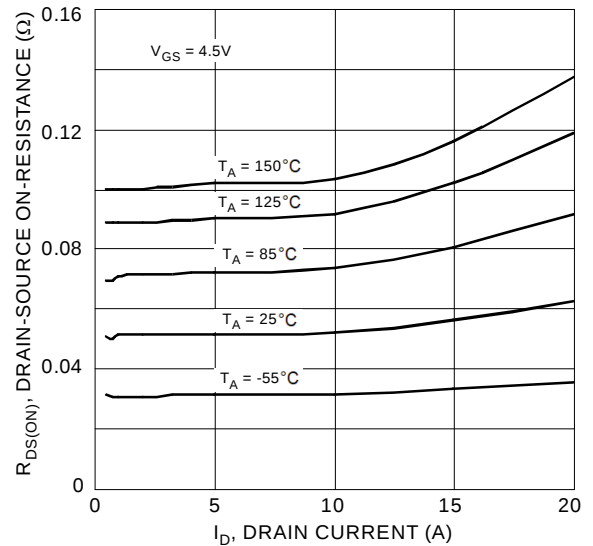


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

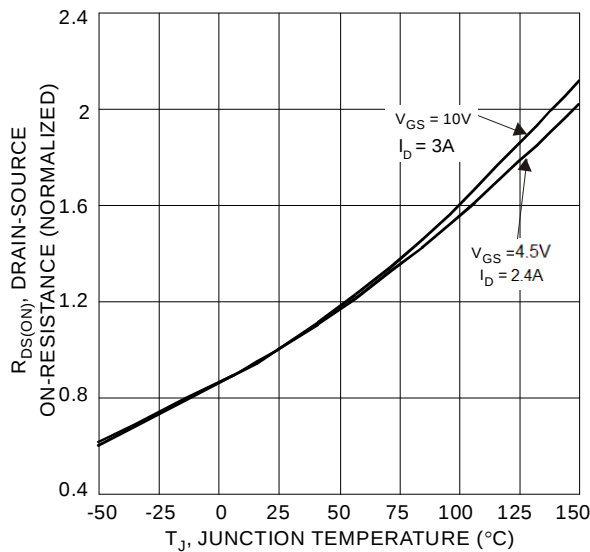


Figure 5 On-Resistance Variation with Temperature

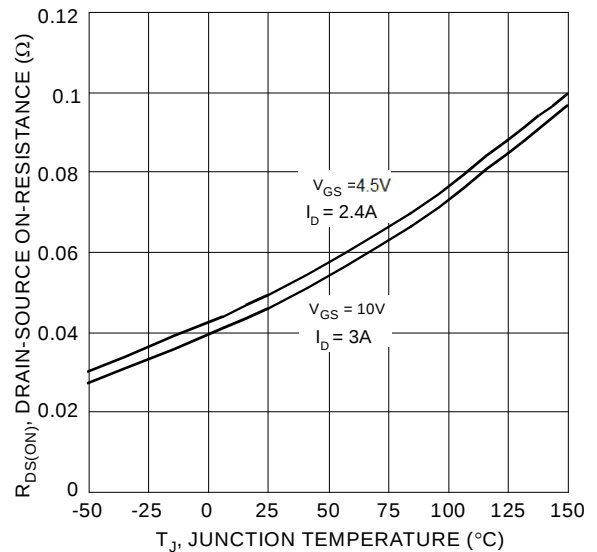


Figure 6 On-Resistance Variation with Temperature

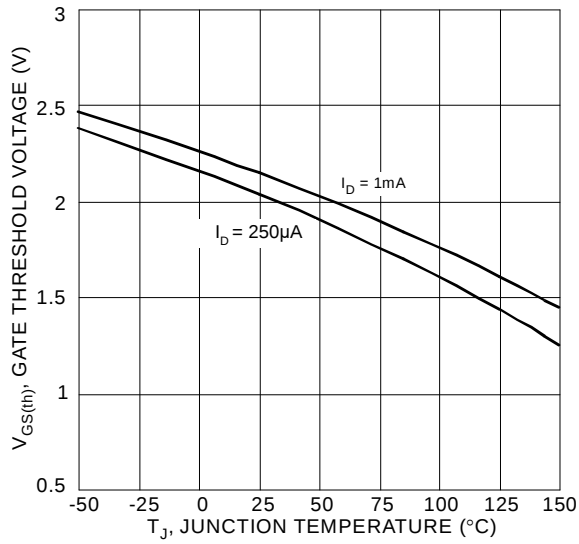


Figure 7 Gate Threshold Variation vs. Junction Temperature

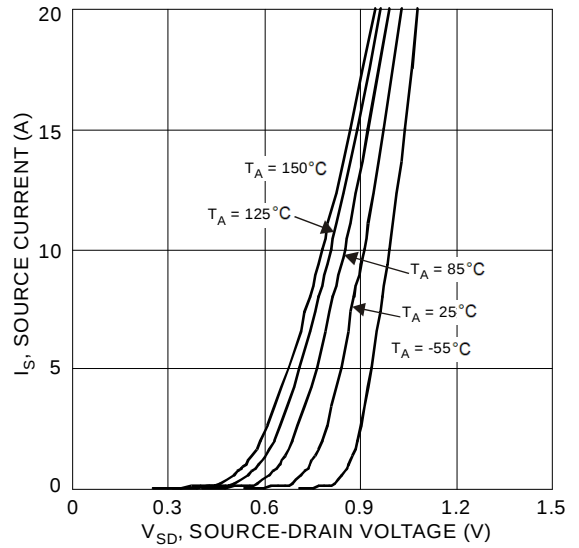


Figure 8 Diode Forward Voltage vs. Current

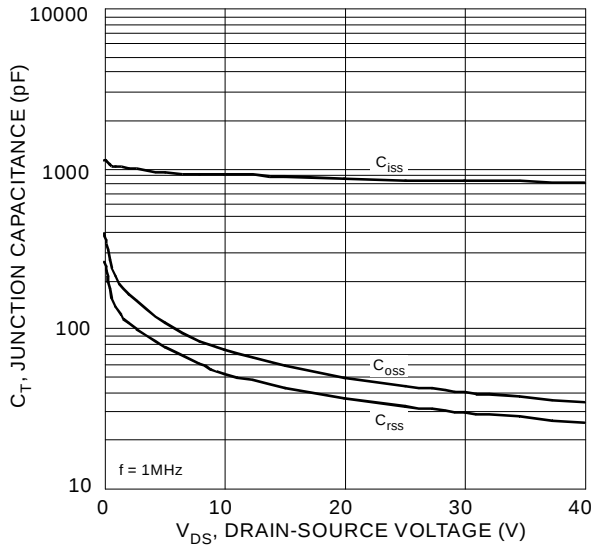


Figure 9 Typical Junction Capacitance

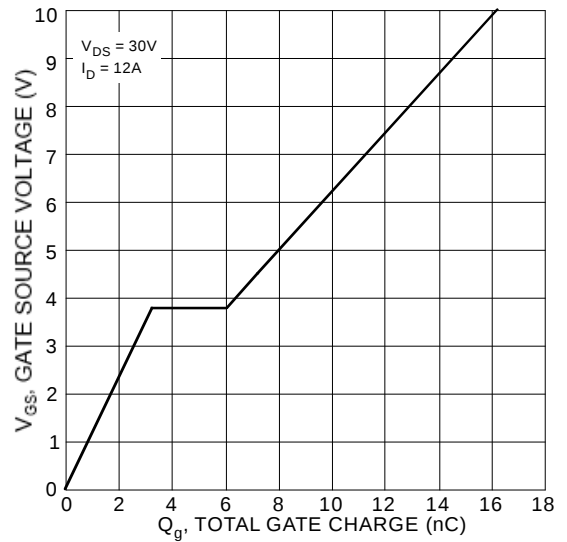


Figure 10 Gate Charge

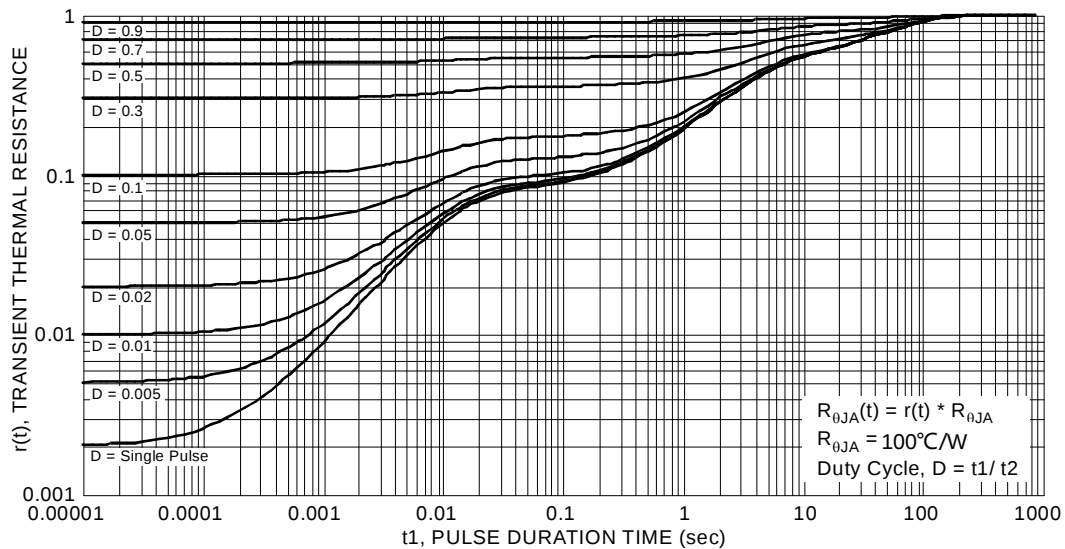
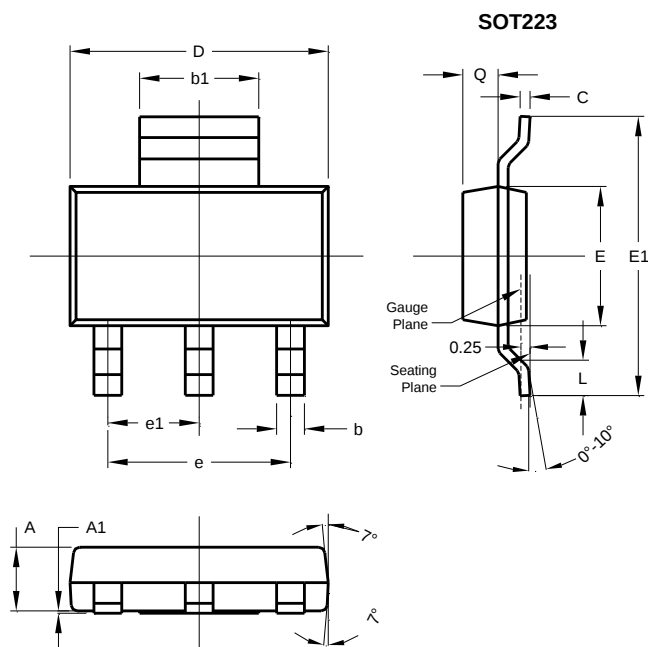


Figure 11 Transient Thermal Resistance

## Package Outline Dimensions

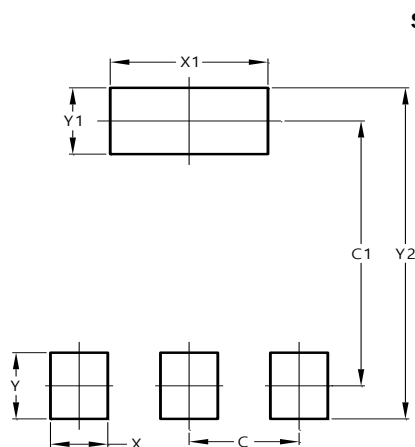
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| 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 <http://www.diodes.com/package-outlines.html> 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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