

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ Max       | $I_D$ Max<br>@ $T_A = +25^\circ C$ |
|---------------|------------------------|------------------------------------|
| 60V           | 1.4Ω @ $V_{GS} = 10V$  | 0.41A                              |
|               | 1.6Ω @ $V_{GS} = 4.5V$ | 0.38A                              |

## Description

This MOSFET has been 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

- Load Switch
- Portable Applications
- Power Management Functions

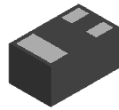
## Features and Benefits

- Footprint of just 0.6mm<sup>2</sup> – thirteen times smaller than SOT23
- Low On-Resistance
- Low Gate Threshold Voltage
- Fast Switching Speed
- Ultra-Small Surface Mount Package
- ESD Protected Gate 200V
- **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**

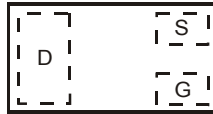
## Mechanical Data

- Case: X1-DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208④
- Weight: 0.001 grams (approximate)

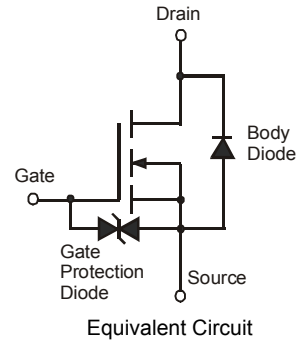
X1-DFN1006-3



Bottom View



Top View  
Internal Schematic



Equivalent Circuit

## Ordering Information (Note 4)

| Product       | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|---------|--------------------|-----------------|-------------------|
| DMN62D1SFB-7B | NH      | 7                  | 8               | 10,000            |

- 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

DMN62D1SFB-7B



Top View  
Bar Denotes Gate  
and Source Side

NH = Product Type Marking Code

**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 5) | V <sub>GS</sub> = 10V | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +85°C | I <sub>D</sub>   | 0.41<br>0.30 | A    |
| Pulsed Drain Current (Note 6)     |                       |                                                  | I <sub>DM</sub>  | 2.64         | A    |

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

| Characteristic                          |                         | Symbol                            | Value       | Unit |
|-----------------------------------------|-------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)              |                         | P <sub>D</sub>                    | 0.47        | W    |
| Thermal Resistance, Junction to Ambient | @T <sub>A</sub> = +25°C | R <sub>θJA</sub>                  | 258         | °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 T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | —   | —     | 100     | nA   | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V                                                 |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | —   | —     | 10<br>1 | μA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V<br>V <sub>GS</sub> = ±5V, V <sub>DS</sub> = 0V |
| <b>ON CHARACTERISTICS (Note 7)</b>                     |                     |     |       |         |      |                                                                                             |
| Gate Threshold Voltage                                 | V <sub>GS(th)</sub> | 1.3 | 1.6   | 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> | —   | —     | 1.40    | Ω    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 40mA                                                |
|                                                        |                     |     |       | 1.60    |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 35mA                                               |
| Forward Transfer Admittance                            | Y <sub>fs</sub>     | 100 | —     | —       | mS   | V <sub>DS</sub> = 5V, I <sub>D</sub> = 40mA                                                 |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | —   | 0.7   | 1.1     | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 300mA                                                |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>                |                     |     |       |         |      |                                                                                             |
| Input Capacitance                                      | C <sub>iss</sub>    | —   | 40    | 80      | pF   | V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                  |
| Output Capacitance                                     | C <sub>oss</sub>    | —   | 3.5   | 7       | pF   |                                                                                             |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | —   | 2.8   | 5.6     | pF   |                                                                                             |
| Gate Resistance                                        | R <sub>g</sub>      | —   | 81.3  | 200     | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                        |
| Total Gate Charge                                      | Q <sub>g</sub>      | —   | 0.73  | 1.5     | nC   | V <sub>GS</sub> = 4.5V                                                                      |
| Total Gate Charge                                      | Q <sub>g</sub>      | —   | 1.39  | 2.8     | nC   | V <sub>GS</sub> = 10V<br>V <sub>DS</sub> = 50V, I <sub>D</sub> = 1A                         |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | —   | 0.2   | 0.4     | nC   |                                                                                             |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | —   | 0.23  | 0.5     | nC   |                                                                                             |
| Turn-On Delay Time                                     | t <sub>D(on)</sub>  | —   | 3.89  | 10      | ns   | V <sub>DS</sub> = 50V, I <sub>D</sub> = 1A<br>V <sub>GS</sub> = 10V, R <sub>G</sub> = 6Ω    |
| Turn-On Rise Time                                      | t <sub>r</sub>      | —   | 4.93  | 10      | ns   |                                                                                             |
| Turn-Off Delay Time                                    | t <sub>D(off)</sub> | —   | 18.80 | 40      | ns   |                                                                                             |
| Turn-Off Fall Time                                     | t <sub>f</sub>      | —   | 11.96 | 25      | ns   |                                                                                             |

- Notes:
5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
  6. Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.
  7. Short duration pulse test used to minimize self-heating effect.
  8. Guaranteed by design. Not subject to production testing.

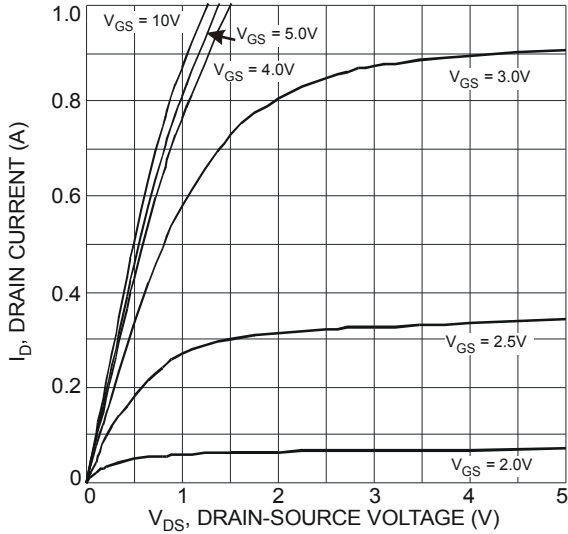


Fig. 1 Typical Output Characteristic

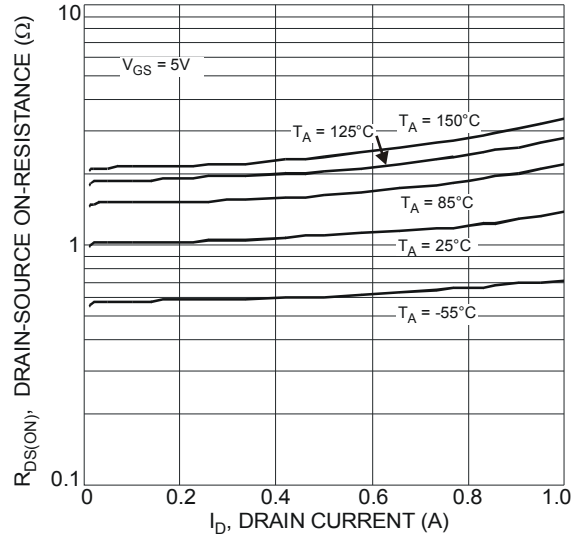


Fig. 2 Typical On-Resistance vs. Drain Current and Temperature

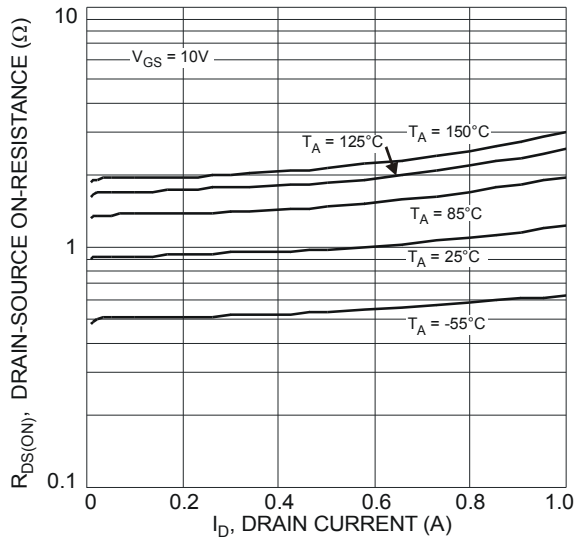


Fig. 3 Typical On-Resistance vs. Drain Current and Temperature

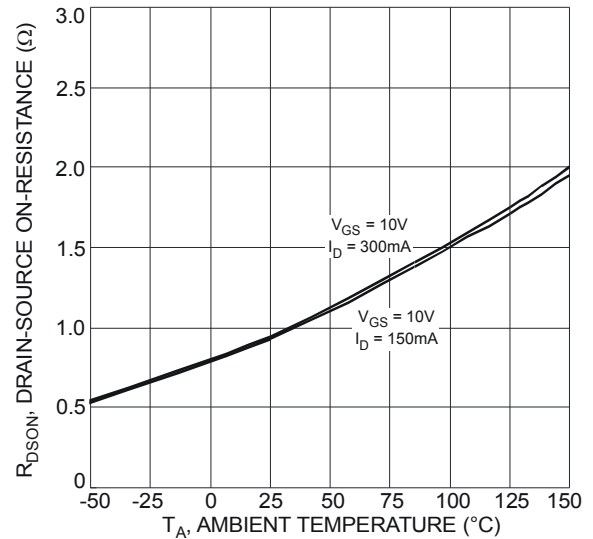


Fig. 4 On-Resistance Variation with Temperature

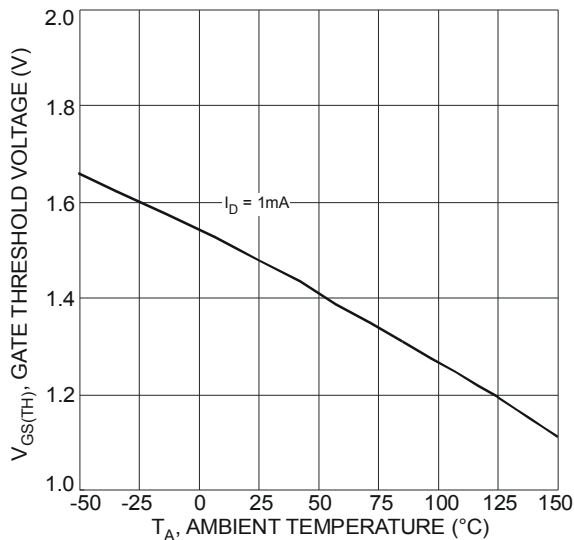


Fig. 5 Gate Threshold Variation vs. Ambient Temperature

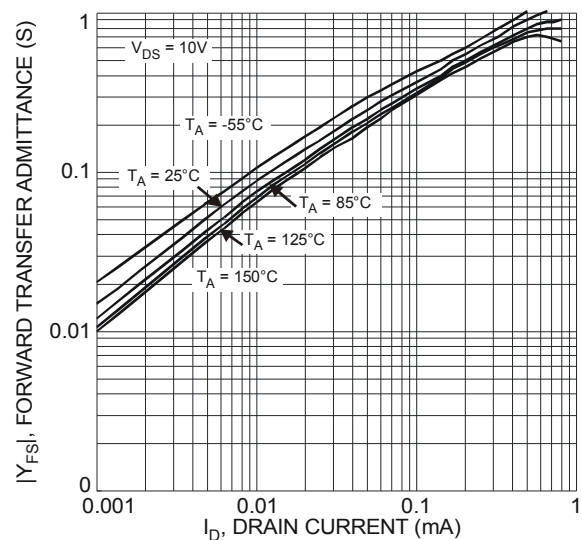


Fig. 6 Forward Transfer Admittance vs. Drain Current

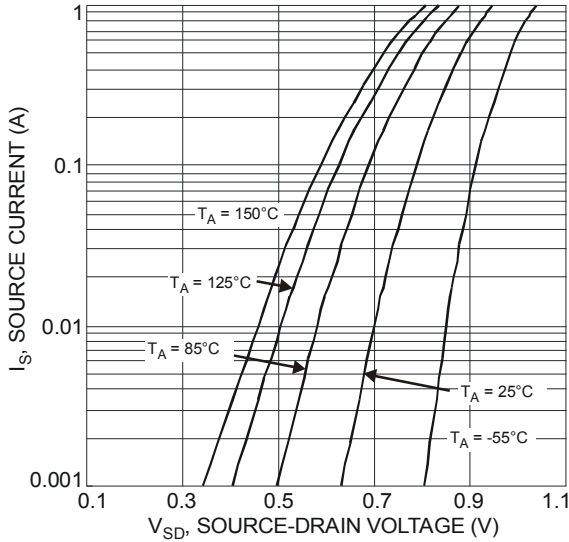


Fig. 7 Diode Forward Voltage vs. Current

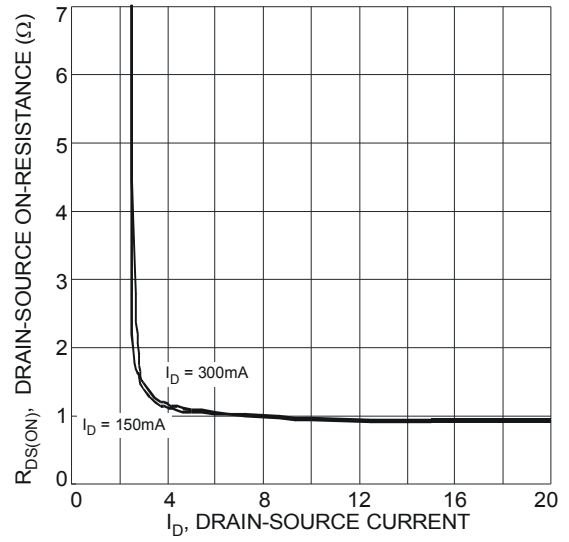


Fig. 8 On-Resistance vs. Drain-Source Current

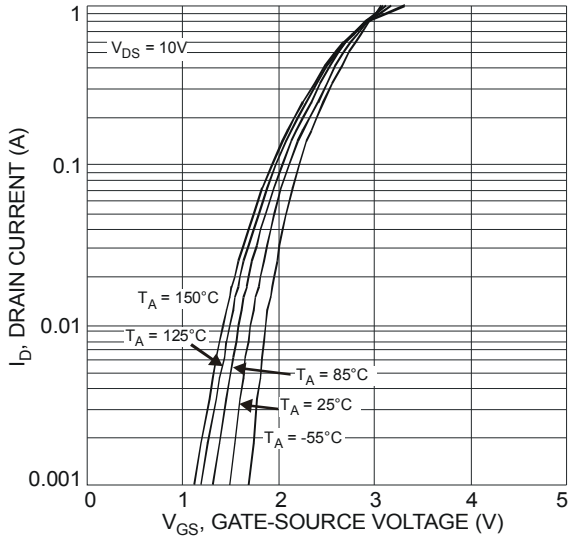


Fig. 9 Typical Transfer Characteristic

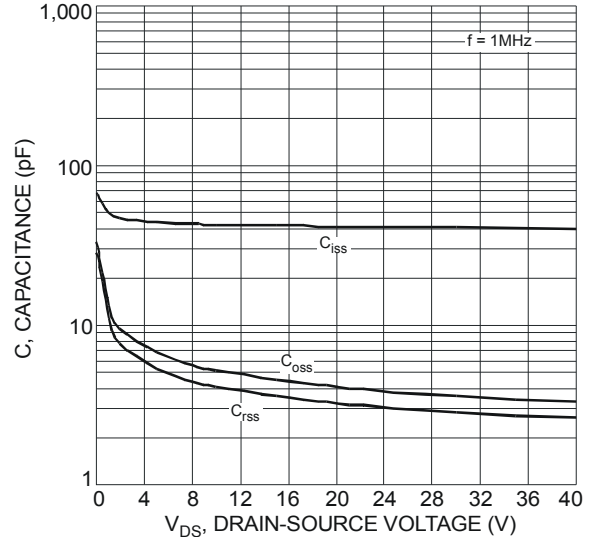


Fig. 10 Typical Total Capacitance

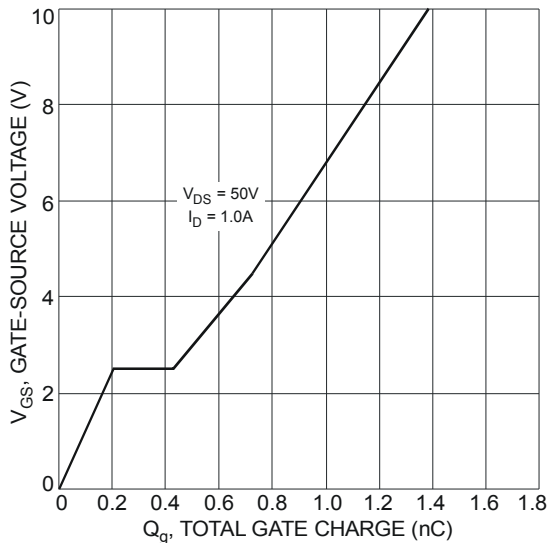
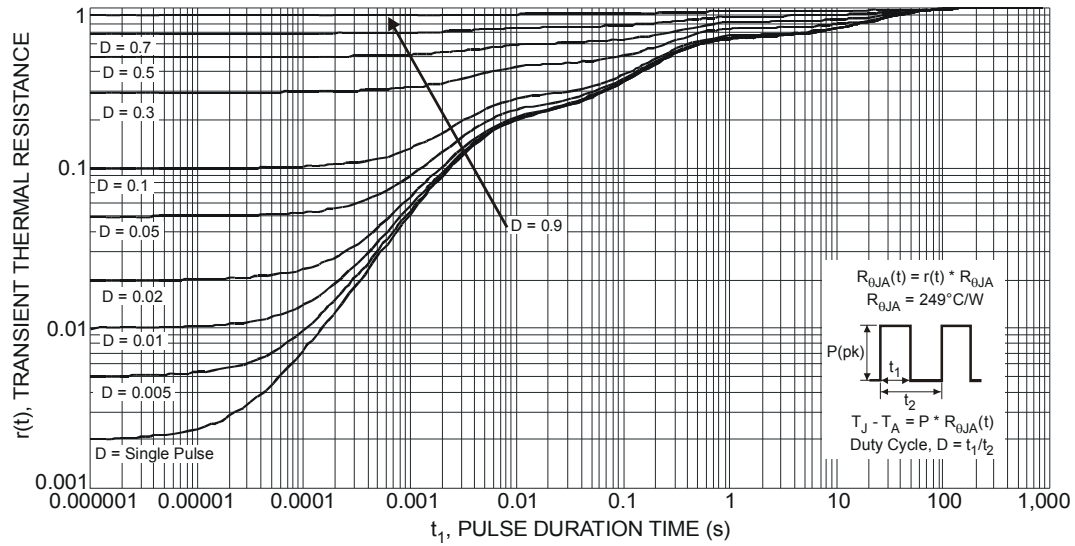
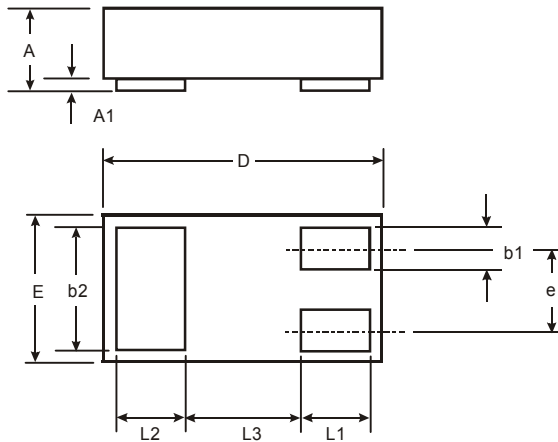


Fig. 11 Gate-Charge Characteristics



## Package Outline Dimensions

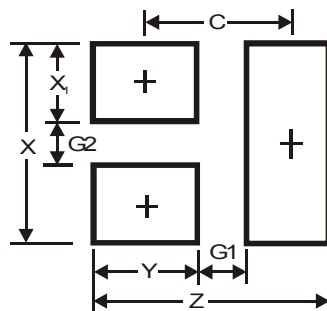
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| X1-DFN1006-3         |      |       |      |
|----------------------|------|-------|------|
| Dim                  | Min  | Max   | Typ  |
| A                    | 0.47 | 0.53  | 0.50 |
| A1                   | 0    | 0.05  | 0.03 |
| b1                   | 0.10 | 0.20  | 0.15 |
| b2                   | 0.45 | 0.55  | 0.50 |
| D                    | 0.95 | 1.075 | 1.00 |
| E                    | 0.55 | 0.675 | 0.60 |
| e                    | —    | —     | 0.35 |
| L1                   | 0.20 | 0.30  | 0.25 |
| L2                   | 0.20 | 0.30  | 0.25 |
| L3                   | —    | —     | 0.40 |
| All Dimensions in mm |      |       |      |

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 1.1           |
| G1         | 0.3           |
| G2         | 0.2           |
| X          | 0.7           |
| X1         | 0.25          |
| Y          | 0.4           |
| C          | 0.7           |

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