

## Features

- Low On-Resistance
- Very Low Gate Threshold Voltage, 0.9V max
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface-Mount Package
- ESD Protected Gate
- Ultra Low Profile Package
- **Totally Lead-Free & Fully 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-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>**

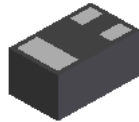
## Mechanical Data

- Package: X2-DFN1006-3
- Package Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish — NiPdAu over Copper Leadframe; Solderable per MIL-STD-202, Method 208 <sup>(e4)</sup>
- Weight: 0.001 grams (Approximate)

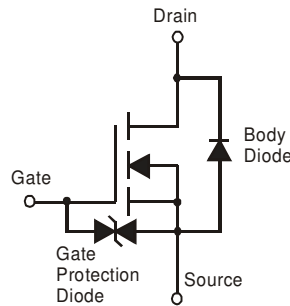


ESD PROTECTED

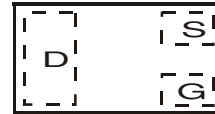
X2-DFN1006-3



Bottom View



Equivalent Circuit




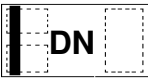
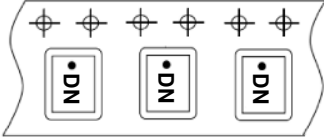
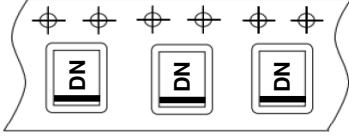

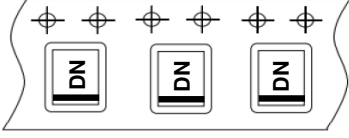
Top View  
Pin-Out

## Ordering Information (Note 4)

| Part Number    | Package      | Marking | Reel Size (inches) | Tape Width (mm) | Packing |         |
|----------------|--------------|---------|--------------------|-----------------|---------|---------|
|                |              |         |                    |                 | Qty.    | Carrier |
| DMN2005LP4K-7  | X2-DFN1006-3 | DN      | 7                  | 8               | 3,000   | Reel    |
| DMN2005LP4K-7B | X2-DFN1006-3 | DN      | 7                  | 8               | 10,000  | Reel    |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  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**

|                              |   |
|------------------------------|---|
| <p><b>DMN2005LP4K-7</b></p>  | <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Top View<br/>Dot Denotes Drain Side</p> </div> <div style="text-align: center;"> <p>From date code 1527 (YYWW),<br/>this changes to:</p>  <p>Top View<br/>Bar Denotes Gate and Source Side</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;">   </div> |
| <p><b>DMN2005LP4K-7B</b></p> | <div style="text-align: center; margin-bottom: 20px;">  <p>Top View<br/>Bar Denotes Gate and Source Side</p> </div> <div style="text-align: right; margin-bottom: 20px;"> <p>DN or <math>\bar{D}N</math> = Product Type Marking Code</p> </div> <div style="text-align: center;">  </div>  |

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

| Characteristic                     | Symbol           | Value           | Unit |
|------------------------------------|------------------|-----------------|------|
| Drain-Source Voltage               | V <sub>DSS</sub> | 20              | V    |
| Gate-Source Voltage                | V <sub>GSS</sub> | ±10             | V    |
| Drain Current per Element (Note 5) | I <sub>D</sub>   | Continuous      | 300  |
|                                    |                  | Pulsed (Note 6) | 350  |
|                                    |                  |                 | mA   |

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

| Characteristic                          | Symbol                            | Value       | Unit |
|---|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)        | P <sub>D</sub>                    | 400         | mW   |
| Thermal Resistance, Junction to Ambient | R <sub>θJA</sub>                  | 280         | °C/W |
| Operating and Storage Temperature Range | T <sub>J</sub> , T <sub>STG</sub> | -65 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 (Per Element) (Note 7)</b> |                     |                  |      |      |      |  |
| Drain-Source Breakdown Voltage                    | BV <sub>DSS</sub>   | 20               | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 100μA   |
| Zero Gate Voltage Drain Current                   | I <sub>DSS</sub>    | —                | —    | 10   | μA   | V <sub>DS</sub> = 17V, V <sub>GS</sub> = 0V  |
| Gate-Source Leakage                               | I <sub>GSS</sub>    | —                | —    | ±5   | μA   | V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Per Element) (Note 7)</b>  |                     |                  |      |      |      |  |
| Gate Threshold Voltage                            | V <sub>GS(TH)</sub> | 0.53             | —    | 0.9  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 100μA                                     |
| Static Drain-Source On-Resistance                 | R <sub>DS(ON)</sub> | —                | 0.35 | 1.5  | Ω    | V <sub>GS</sub> = 4V, I <sub>D</sub> = 10mA  |
|   |                     | —                | 0.4  | 1.7  |      | V <sub>GS</sub> = 2.7V, I <sub>D</sub> = 200mA   |
|   |                     | —                | 0.45 | 1.7  |      | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 10mA  |
|   |                     | —                | 0.55 | 3.5  |      | V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 200mA   |
|   |                     | —                | 0.65 | 3.5  |      | V <sub>GS</sub> = 1.5V, I <sub>D</sub> = 1mA   |
| Forward Transfer Admittance                       | Y <sub>fs</sub>     | 40               | —    | —    | mS   | V <sub>DS</sub> = 3V, I <sub>D</sub> = 10mA  |
| <b>DYNAMIC CHARACTERISTICS</b>                    |                     |                  |      |      |      |  |
| Input Capacitance                                 | C <sub>iss</sub>    | —                | 37.1 | —    | pF   | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                      |
| Output Capacitance                                | C <sub>oss</sub>    | —                | 6.5  | —    | pF   |  |
| Reverse Transfer Capacitance                      | C <sub>rss</sub>    | —                | 4.8  | —    | pF   |  |
| Switching Time                                    | Turn-On Time        | t <sub>on</sub>  | —    | 4.06 | ns   | V <sub>DD</sub> = 10V, R <sub>I</sub> = 47Ω, V <sub>GEN</sub> = 4.5V<br>R <sub>GEN</sub> = 10Ω |
|   | Turn-Off Time       | t <sub>off</sub> | —    | 13.7 |      |  |

- Notes:
5. Device mounted on FR-4 PCB.
  6. Pulse width ≤ 10μs, duty cycle ≤ 1%.
  7. Short duration pulse test used to minimize self-heating effect.

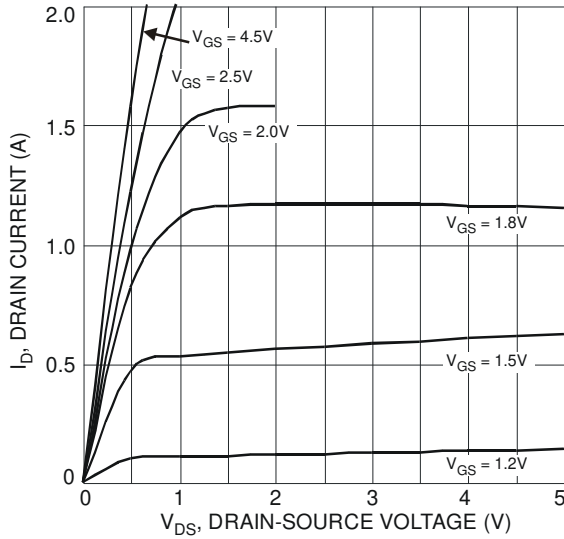


Fig. 1 Typical Output Characteristics

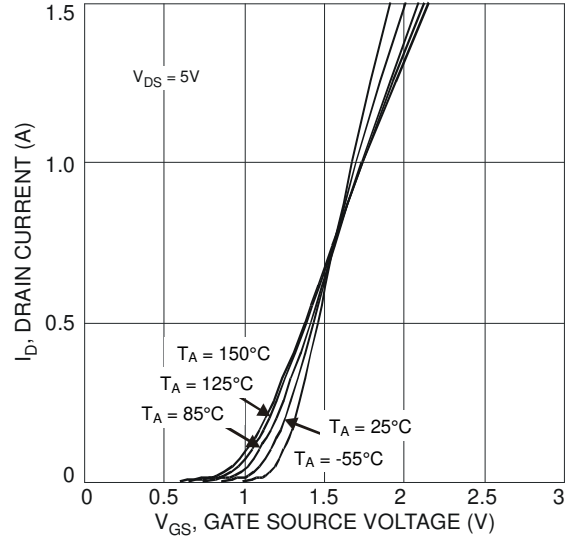


Fig. 2 Typical Transfer Characteristics

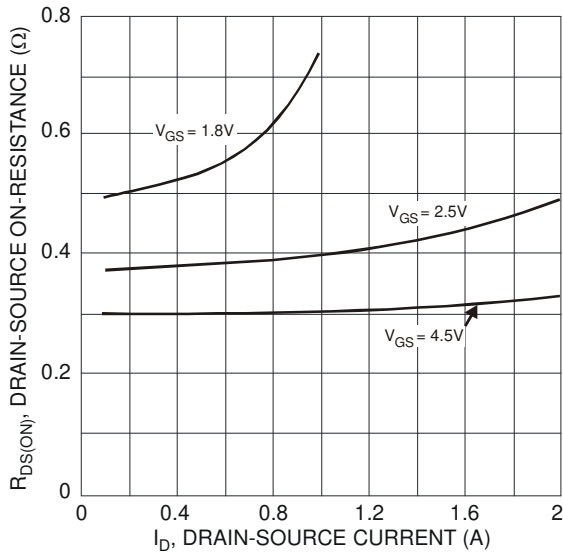


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

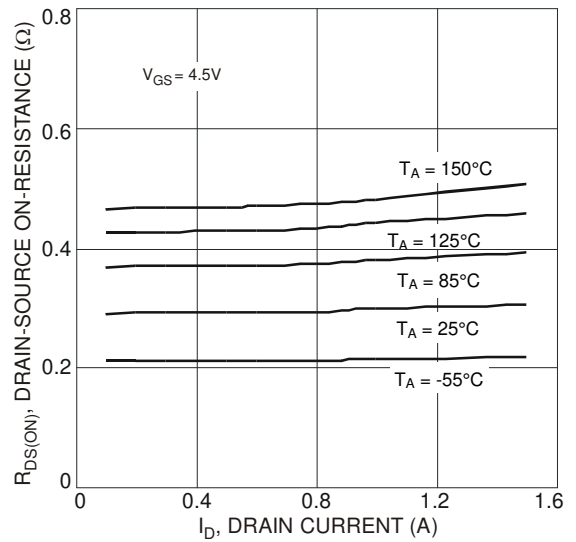


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

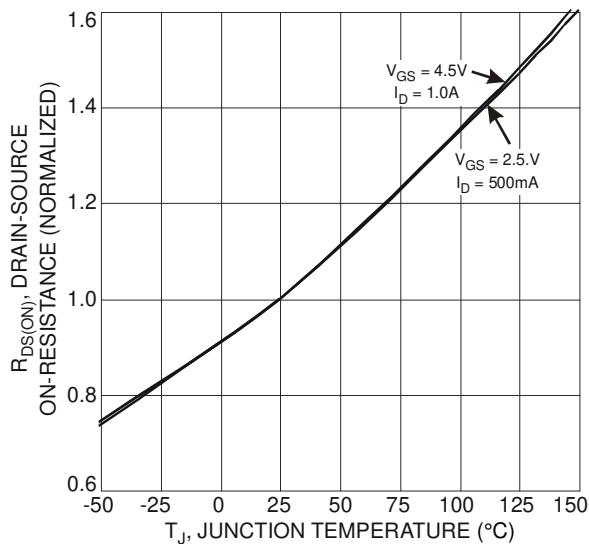


Fig. 5 On-Resistance Variation with Temperature

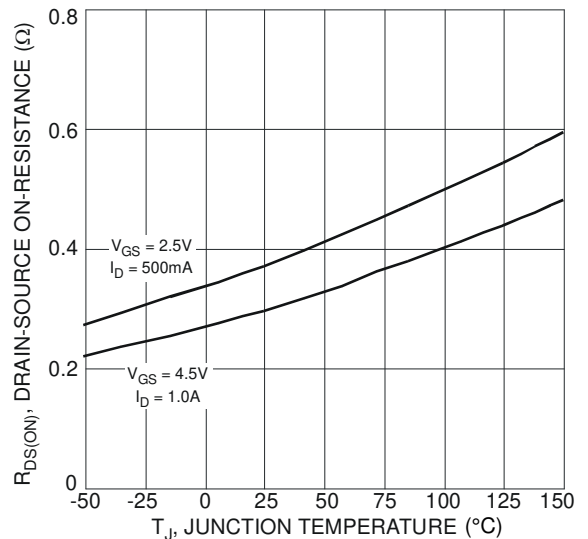


Fig. 6 On-Resistance Variation with Temperature

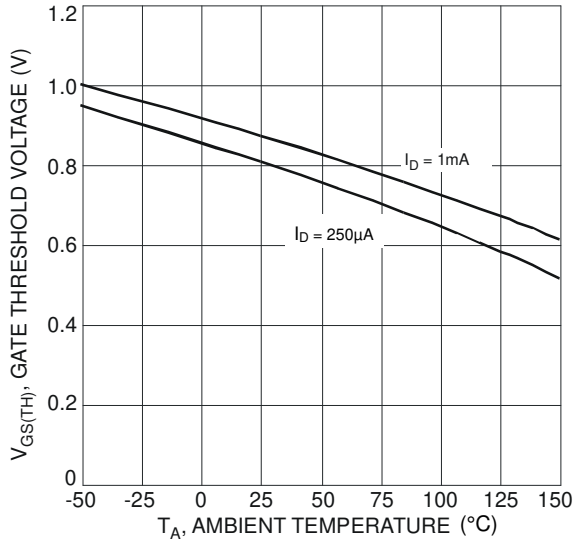


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

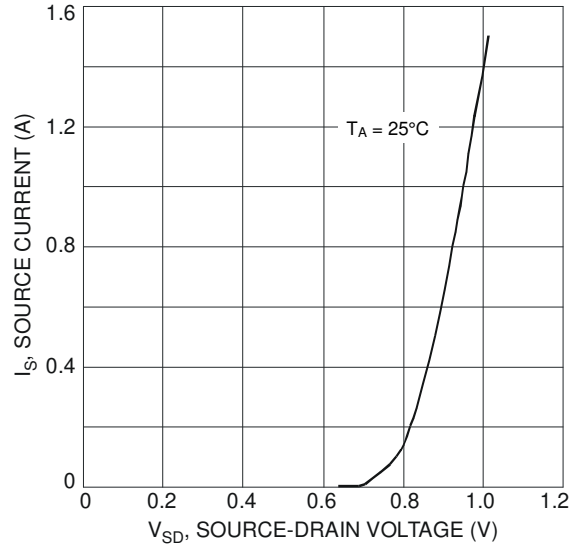


Fig. 8 Diode Forward Voltage vs. Current

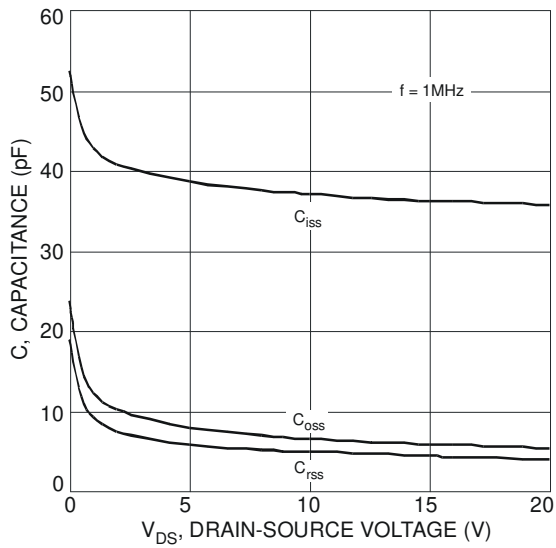
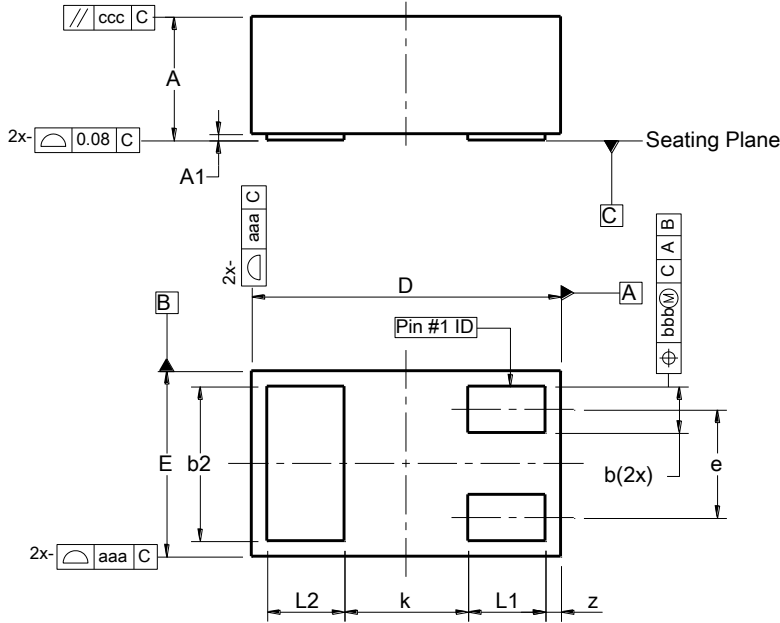


Fig. 9 Typical Capacitance

**Package Outline Dimensions**

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

**X2-DFN1006-3**

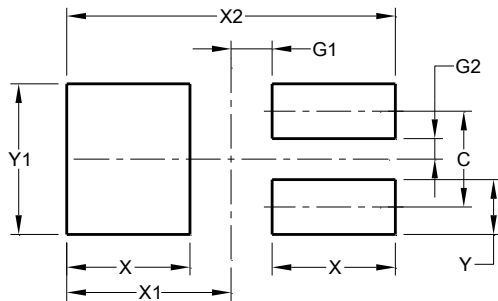


| X2-DFN1006-3         |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | —    | 0.40 | —    |
| A1                   | 0.00 | 0.05 | 0.03 |
| b                    | 0.10 | 0.20 | 0.15 |
| b2                   | 0.45 | 0.55 | 0.50 |
| D                    | 0.95 | 1.05 | 1.00 |
| E                    | 0.55 | 0.65 | 0.60 |
| e                    | -    | -    | 0.35 |
| L1                   | 0.20 | 0.30 | 0.25 |
| L2                   | 0.20 | 0.30 | 0.25 |
| k                    | -    | -    | 0.40 |
| z                    | 0.02 | 0.08 | 0.05 |
| aaa                  |      | 0.15 |      |
| bbb                  |      | 0.05 |      |
| ccc                  |      | 0.05 |      |
| All Dimensions in mm |      |      |      |

**Suggested Pad Layout**

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

**X2-DFN1006-3**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.350         |
| G1         | 0.150         |
| G2         | 0.075         |
| X          | 0.450         |
| X1         | 0.600         |
| X2         | 1.200         |
| Y          | 0.200         |
| Y1         | 0.550         |

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