

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub>        | Package      | I <sub>D</sub><br>T <sub>A</sub> = +25°C |
|-------------------|----------------------------|--------------|--|
| -50V              | 8Ω @ V <sub>GS</sub> = -5V | X1-DFN1006-3 | -310mA                                   |

## Description

This new generation MOSFET is 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.

## Applications

- DC-DC converters
- Power management functions
- Battery operated systems and solid-state relays
- Drivers: relays, solenoids, lamps, hammers, displays, memories, transistors, etc.

## Features

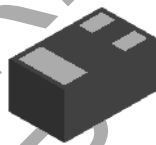
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected 1kV
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/104/200, 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

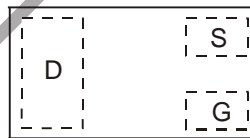
- Package: X1-DFN1006-3
- Package Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu. Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.001 grams (Approximate)



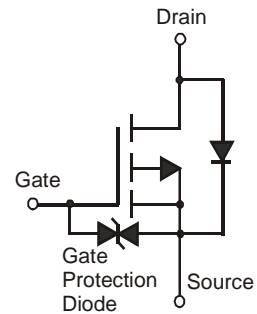
X1-DFN1006-3



Bottom View



Top View  
Pin-Out





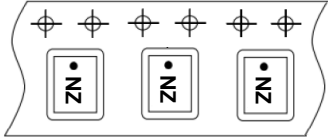
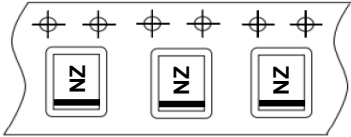

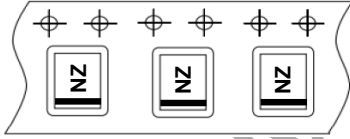
Equivalent Circuit

## Ordering Information (Note 4)

| Part Number   | Package      | Packing |             |
|---------------|--------------|---------|-------------|
|               |              | Qty.    | Carrier     |
| DMP58D0LFB-7  | X1-DFN1006-3 | 3,000   | Tape & Reel |
| DMP58D0LFB-7B | X1-DFN1006-3 | 10,000  | 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

|                      |  |   |
|----------------------|--|---|
| <b>DMP58D0LFB-7</b>  |   | <p>From date code 1527 (YYWW),<br/>this changes to:</p>  |
|                      |   |   |
| <b>DMP58D0LFB-7B</b> |   | <p>NZ = Product Type Marking Code</p>   |
|                      |  |   |

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

| Characteristic  | Symbol           | Value  | Unit |
|---|------------------|--|------|
| Drain-Source Voltage                                    | V <sub>DSS</sub> | -50  | V    |
| Gate-Source Voltage                                     | V <sub>GSS</sub> | ±20  | V    |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = -5V | I <sub>D</sub>   | T <sub>A</sub> = +25°C<br>-180<br>T <sub>A</sub> = +70°C<br>-150 | mA   |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = -5V | I <sub>D</sub>   | T <sub>A</sub> = +25°C<br>-310<br>T <sub>A</sub> = +70°C<br>-250 | mA   |
| Pulsed Drain Current (Note 7)                           | I <sub>DM</sub>  | -500   | mA   |

## Thermal Characteristics

| Characteristic   | Symbol                            | Max         | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)   | P <sub>D</sub>                    | 0.47        | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5) | R <sub>θJA</sub>                  | 258         | °C/W |
| Power Dissipation (Note 6)   | P <sub>D</sub>                    | 1.22        | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6) | R <sub>θJA</sub>                  | 105         | °C/W |
| Operating and Storage Temperature Range                                  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

- 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. Repetitive rating, pulse width limited by junction temperature.

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

| Characteristic   | Symbol              | Min  | Typ   | Max  | Unit | Test Condition   |
|--|---------------------|------|-------|------|------|--|
| <b>OFF CHARACTERISTICS (Note 8)</b>                    |                     |      |       |      |      |  |
| Drain-Source Breakdown Voltage                         | BV <sub>DSS</sub>   | -50  | —     | —    | 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>    | —    | —     | -1.0 | μA   | V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | —    | —     | ±5   | μA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 8)</b>                     |                     |      |       |      |      |  |
| Gate Threshold Voltage                                 | V <sub>GS(TH)</sub> | -0.8 | —     | -2.1 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                      |
| Static Drain-Source On-Resistance                      | R <sub>DS(ON)</sub> | —    | 6     | 8    | Ω    | V <sub>GS</sub> = -5V, I <sub>D</sub> = -100mA   |
|  |                     | —    | 12    | 18   | Ω    | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -10mA  |
| Forward Transfer Admittance                            | Y <sub>fs</sub>     | 0.05 | —     | —    | S    | V <sub>DS</sub> = -25V, I <sub>D</sub> = -100mA  |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>                |                     |      |       |      |      |  |
| Input Capacitance                                      | C <sub>iss</sub>    | —    | 27    | —    | pF   | V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                      |
| Output Capacitance                                     | C <sub>oss</sub>    | —    | 4.0   | —    |      |  |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | —    | 1.4   | —    |      |  |
| Turn-On Delay Time                                     | t <sub>D(ON)</sub>  | —    | 30.7  | —    | ns   | V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -30V,<br>R <sub>G</sub> = 50Ω, I <sub>D</sub> = -10mA |
| Turn-On Rise Time                                      | t <sub>R</sub>      | —    | 84.1  | —    |      |  |
| Turn-Off Delay Time                                    | t <sub>D(OFF)</sub> | —    | 201.8 | —    |      |  |
| Turn-Off Fall Time                                     | t <sub>F</sub>      | —    | 32.2  | —    |      |  |

Notes: 8. Short duration pulse test used to minimize self-heating effect.  
 9. Guaranteed by design. Not subject to production testing.

NOT RECOMMENDED FOR NEW DESIGN

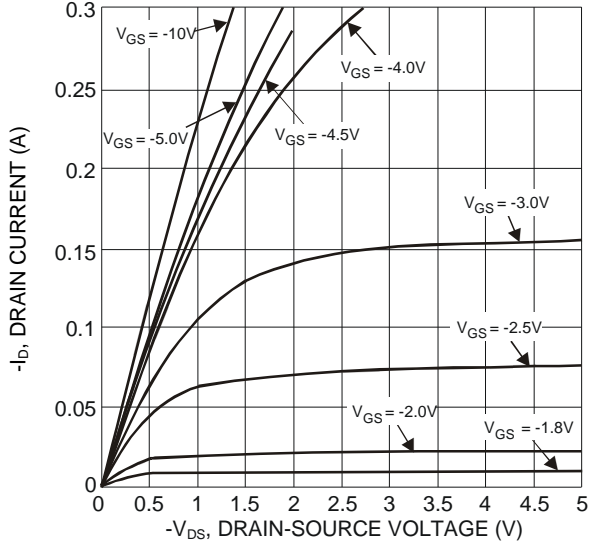


Figure 1. Typical Output Characteristics

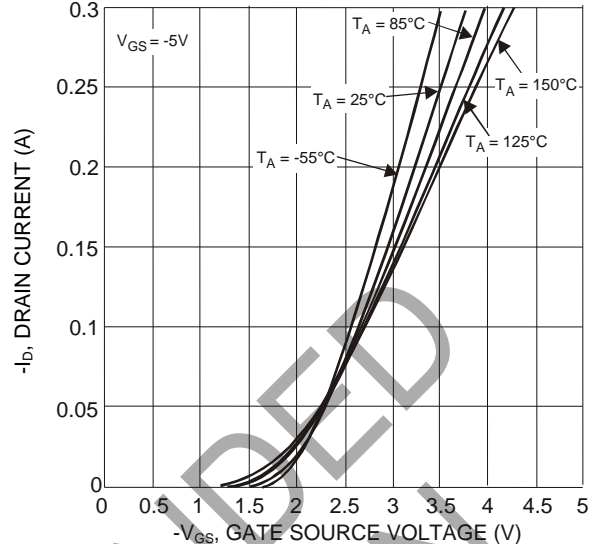


Figure 2. Typical Transfer Characteristics

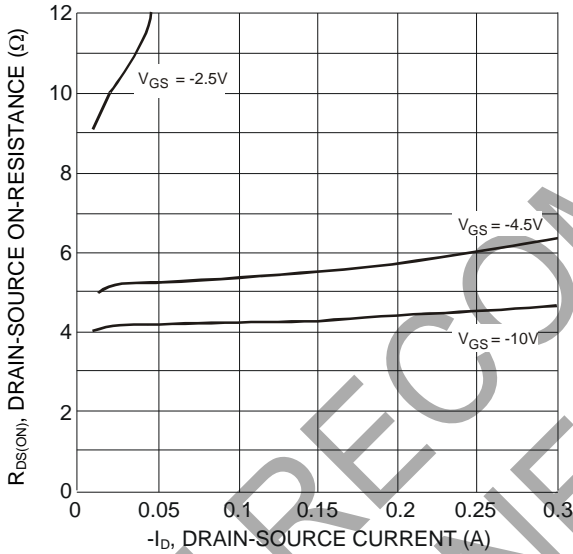


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

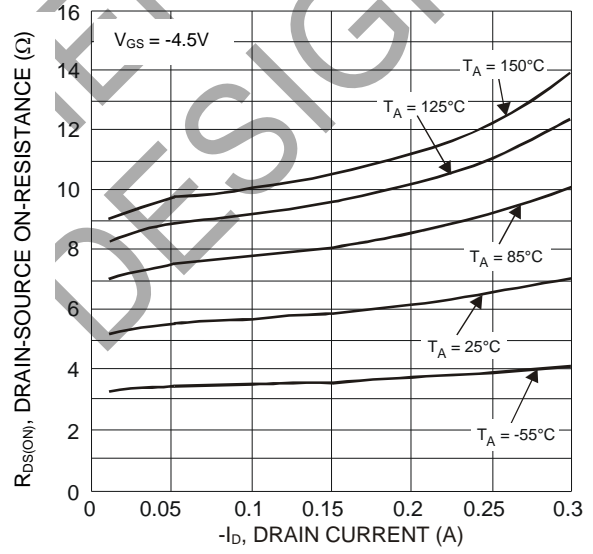


Figure 4. On-Resistance vs. Drain Current and Temperature

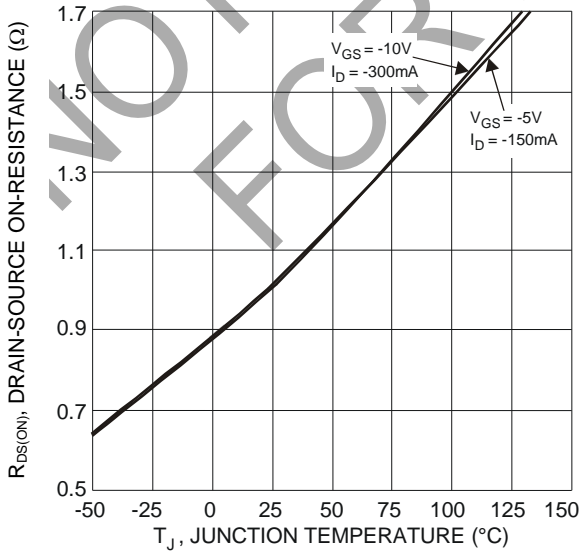


Figure 5. On-Resistance Variation with Temperature

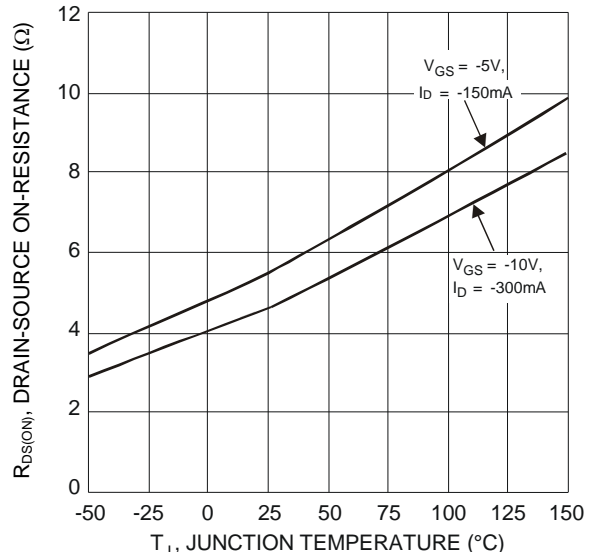


Figure 6. On-Resistance vs. Temperature

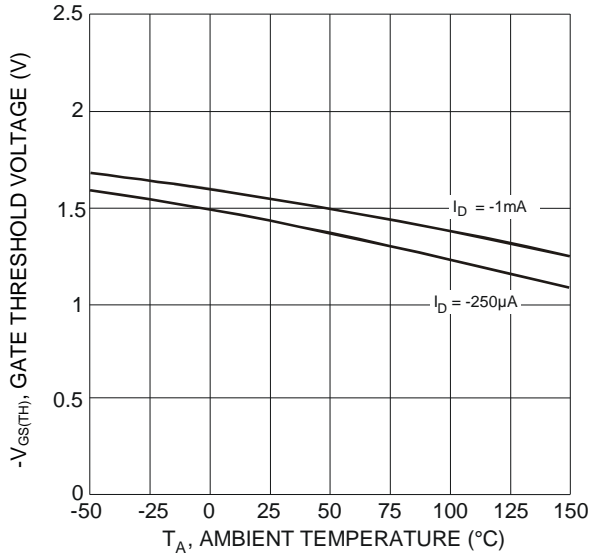


Figure 7. Gate Threshold Variation vs. Ambient Temperature

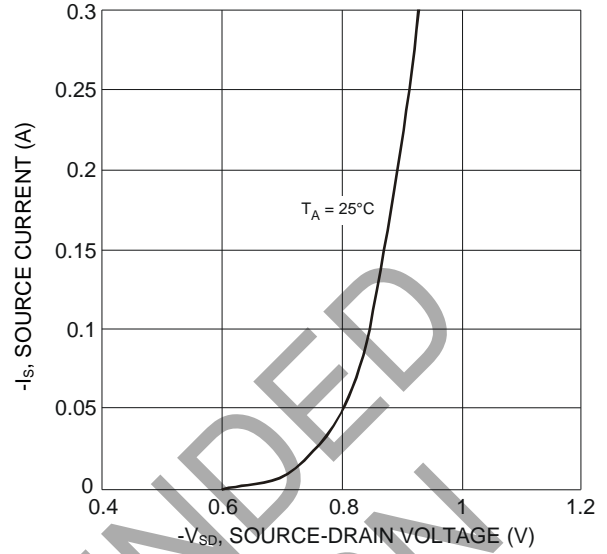


Figure 8. Diode Forward Voltage vs. Current

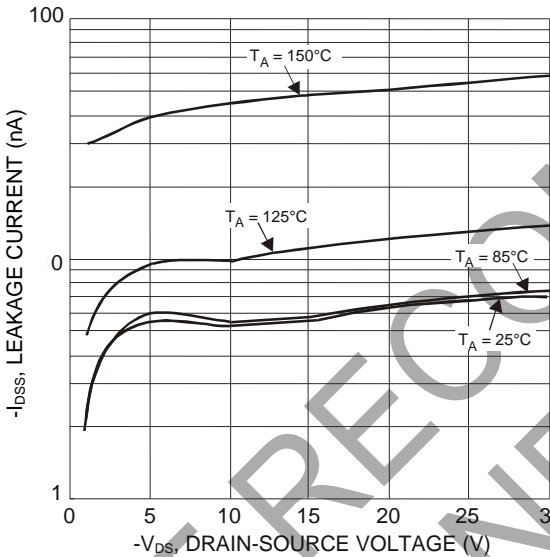


Figure 9. Typical Drain-Source Leakage Current vs. Voltage

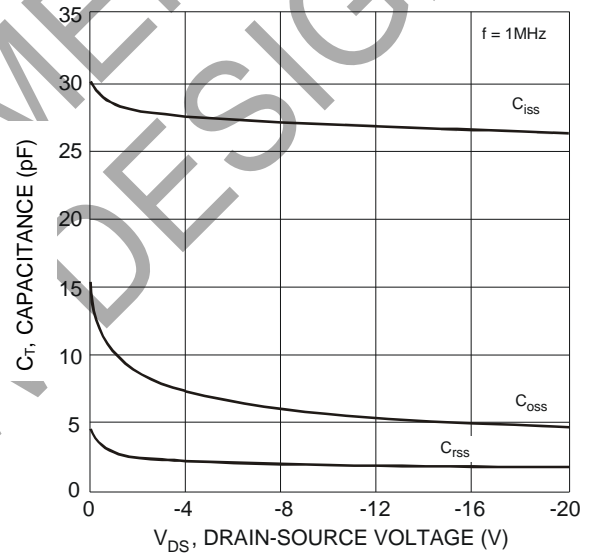


Figure 10. Typical Junction Capacitance

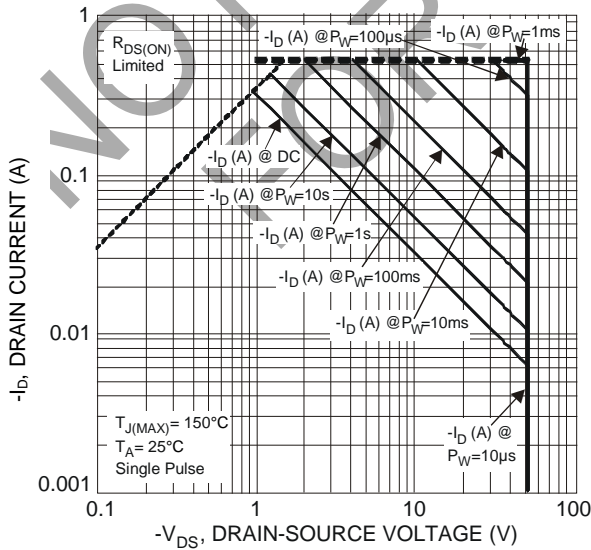
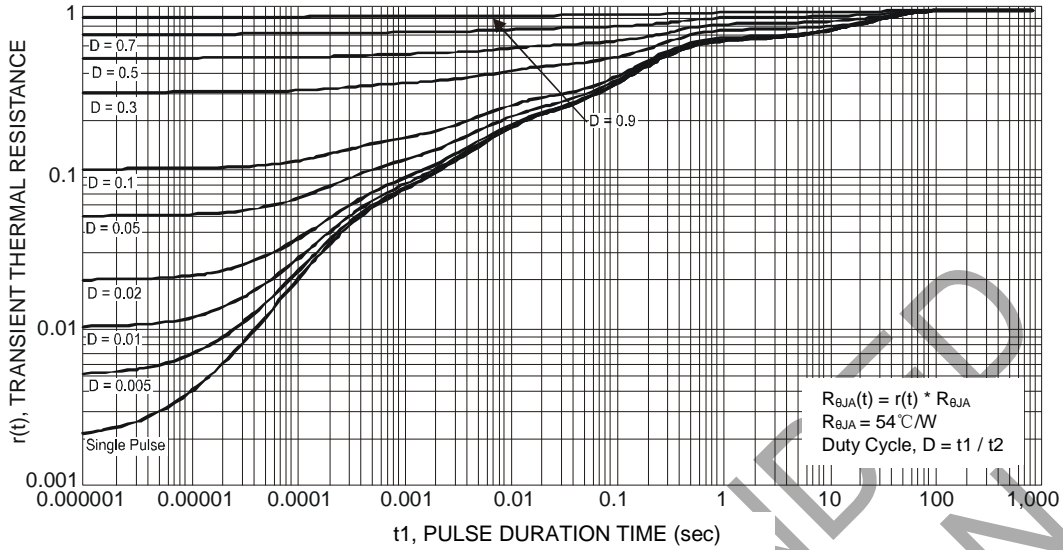


Figure 11. SOA, Safe Operation Area

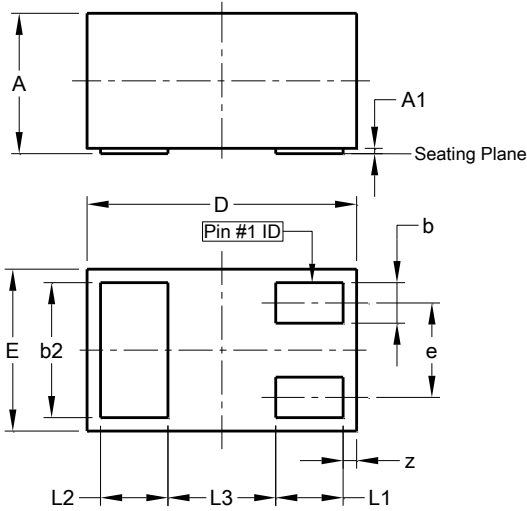


NOT RECOMMENDED FOR NEW DESIGN

**Package Outline Dimensions**

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

**X1-DFN1006-3**

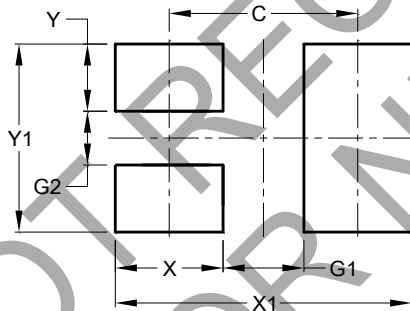


| X1-DFN1006-3         |      |       |      |
|----------------------|------|-------|------|
| Dim                  | Min  | Max   | Typ  |
| A                    | 0.47 | 0.53  | 0.50 |
| A1                   | 0.00 | 0.05  | 0.03 |
| b                    | 0.10 | 0.20  | 0.15 |
| b2                   | 0.45 | 0.55  | 0.50 |
| D                    | 0.95 | 1.075 | 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 |
| z                    | 0.02 | 0.08  | 0.05 |
| All Dimensions in mm |      |       |      |

**Suggested Pad Layout**

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

**X1-DFN1006-3**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.70          |
| G1         | 0.30          |
| G2         | 0.20          |
| X          | 0.40          |
| X1         | 1.10          |
| Y          | 0.25          |
| Y1         | 0.70          |

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