

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub>           | I <sub>D</sub><br>T <sub>A</sub> = +25°C |
|-------------------|-------------------------------|------------------------------------------|
| -20V              | 5Ω @ V <sub>GS</sub> = -4.5V  | -200mA                                   |
|                   | 7Ω @ V <sub>GS</sub> = -2.5V  | -170mA                                   |
|                   | 10Ω @ V <sub>GS</sub> = -1.8V | -140mA                                   |
|                   | 15Ω @ V <sub>GS</sub> = -1.5V | -50mA                                    |

## 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

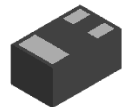
## Features and Benefits

- P-Channel MOSFET
- Low On-Resistance
- Very Low Gate Threshold Voltage V<sub>GS(TH)</sub>
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surfaced Mount Package
- Ultra-Low Package Profile, 0.4mm Maximum Package Height
- ESD Protected Gate
- 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-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact_us) or your local Diodes representative.  
<https://www.diodes.com/quality/product-definitions/>

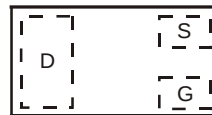
## Mechanical Data

- Case: X2-DFN1006-3
- Case 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 @4
- Weight: 0.001 grams (Approximate)

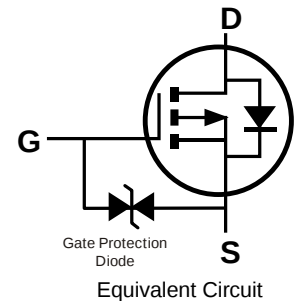
### X2-DFN1006-3



Bottom View



Top View  
Internal Schematic

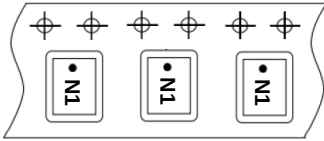
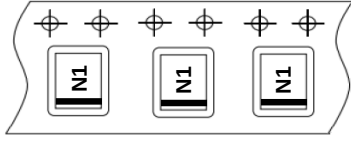
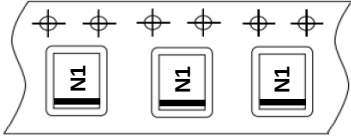


## Ordering Information (Note 4)

| Part Number    | Case         | Packaging          |
|----------------|--------------|--------------------|
| DMP210DUFB4-7  | X2-DFN1006-3 | 3,000/Tape & Reel  |
| DMP210DUFB4-7B | X2-DFN1006-3 | 10,000/Tape & 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>DMP210DUFB4-7</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; align-items: center; margin-top: 10px;">   </div> |
| <p><b>DMP210DUFB4-7B</b></p> | <div style="text-align: center; margin-bottom: 10px;">  <p>Top View<br/>Bar Denotes Gate and Source Side</p> </div> <div style="display: flex; justify-content: space-between; align-items: center;">  <div> <p>N1 = Part Marking Code</p> </div> </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    |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -200<br>-160 | mA   |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = -1.8V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -140<br>-110 | mA   |
| Pulsed Drain Current<br>t <sub>P</sub> = 10μs             |              |                                                  | I <sub>DM</sub>  | -600         | mA   |

**Thermal Characteristics**

| Characteristic                                   | Symbol                            | Value       | Unit |
|--------------------------------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 350         | mW   |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 357         | °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                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------|---------------------|-------|-------|-------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| OFF CHARACTERISTICS (Note 6)                                                                                    |                     |       |       |                   |                |                                                                                                                                                  |
| Drain-Source Breakdown Voltage                                                                                  | BV <sub>DSS</sub>   | -20   | —     | —                 | V              | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA                                                                                                    |
| Zero Gate Voltage Drain Current                                                                                 | I <sub>DSS</sub>    | —     | —     | -100<br>-50       | nA<br>nA       | V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = -5.0V, V <sub>GS</sub> = 0V                                                    |
| Gate-Source Leakage                                                                                             | I <sub>GSS</sub>    | —     | —     | ±100<br>±1<br>±10 | nA<br>μA<br>μA | V <sub>GS</sub> = ±5.0V, V <sub>DS</sub> = 0V<br>V <sub>GS</sub> = ±8.0V, V <sub>DS</sub> = 0V<br>V <sub>GS</sub> = ±10.0V, V <sub>DS</sub> = 0V |
| ON CHARACTERISTICS (Note 6)                                                                                     |                     |       |       |                   |                |                                                                                                                                                  |
| Gate Threshold Voltage @T <sub>J</sub> = +25°C                                                                  | V <sub>GS(TH)</sub> | -0.5  | —     | -1.0              | V              | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                                                                      |
| Gate Threshold Voltage (Note 7)<br>@T <sub>J</sub> = 0°C<br>@T <sub>J</sub> = +85°C<br>@T <sub>J</sub> = +100°C | V <sub>GS(TH)</sub> | -0.55 | —     | -1.05             | V              | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                                                                      |
|                                                                                                                 |                     | -0.40 | —     | -0.90             |                |                                                                                                                                                  |
|                                                                                                                 |                     | -0.35 | —     | -0.85             |                |                                                                                                                                                  |
| Static Drain-Source On-Resistance                                                                               | R <sub>DS(ON)</sub> | —     | —     | 5                 | Ω              | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -100mA                                                                                                 |
|                                                                                                                 |                     | —     | —     | 7                 |                | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -50mA                                                                                                  |
|                                                                                                                 |                     | —     | —     | 10                |                | V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -20mA                                                                                                  |
|                                                                                                                 |                     | —     | —     | 15                |                | V <sub>GS</sub> = -1.5V, I <sub>D</sub> = -10mA                                                                                                  |
|                                                                                                                 |                     | —     | 20    | —                 |                | V <sub>GS</sub> = -1.2V, I <sub>D</sub> = -1mA                                                                                                   |
| Forward Transfer Admittance                                                                                     | Y <sub>FS</sub>     | —     | 200   | —                 | mS             | V <sub>DS</sub> = -10V, I <sub>D</sub> = -200mA                                                                                                  |
| Diode Forward Voltage (Note 5)                                                                                  | V <sub>SD</sub>     | -0.5  | —     | -1.2              | V              | V <sub>GS</sub> = 0V, I <sub>S</sub> = -115mA                                                                                                    |
| DYNAMIC CHARACTERISTICS (Note 7)                                                                                |                     |       |       |                   |                |                                                                                                                                                  |
| Input Capacitance                                                                                               | C <sub>iss</sub>    | —     | 13.72 | 175               | pF             | V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                                                                       |
| Output Capacitance                                                                                              | C <sub>oss</sub>    | —     | 4.01  | 30                | pF             |                                                                                                                                                  |
| Reverse Transfer Capacitance                                                                                    | C <sub>rss</sub>    | —     | 2.34  | 20                | pF             |                                                                                                                                                  |
| SWITCHING CHARACTERISTICS (Note 7)                                                                              |                     |       |       |                   |                |                                                                                                                                                  |
| Turn-On Delay Time                                                                                              | t <sub>D(ON)</sub>  | —     | 7.7   | —                 | ns             | V <sub>GS</sub> = -4.5V, V <sub>DD</sub> = -15V<br>I <sub>D</sub> = -180mA, R <sub>G</sub> = 2.0Ω                                                |
| Rise Time                                                                                                       | t <sub>r</sub>      | —     | 19.3  | —                 |                |                                                                                                                                                  |
| Turn-Off Delay Time                                                                                             | t <sub>D(OFF)</sub> | —     | 25.9  | —                 |                |                                                                                                                                                  |
| Fall Time                                                                                                       | t <sub>f</sub>      | —     | 31.5  | —                 |                |                                                                                                                                                  |

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

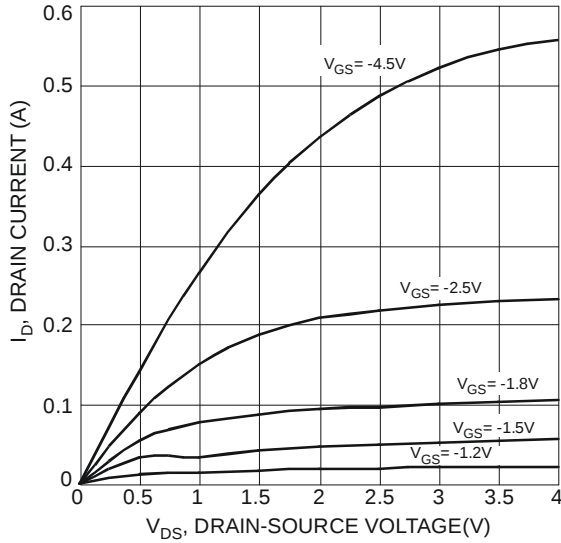


Fig. 1 Typical Output Characteristics

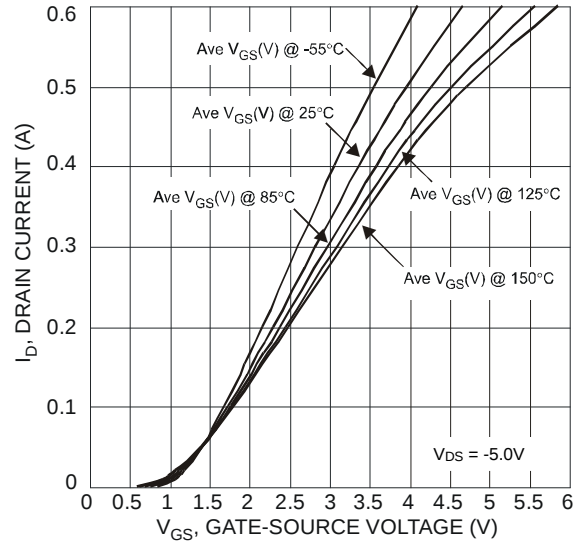


Fig. 2 Typical Transfer Characteristics

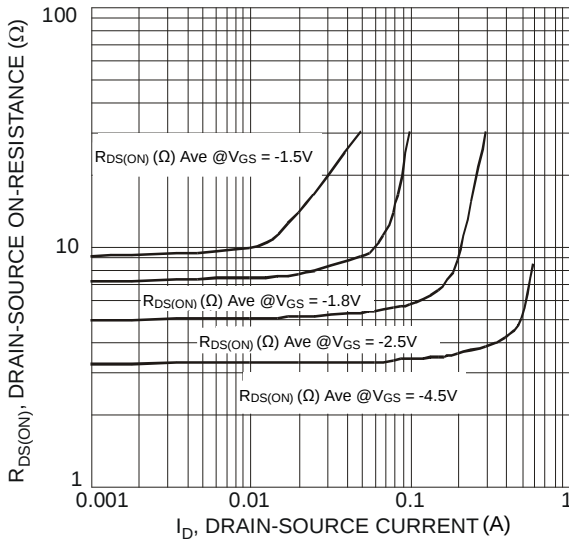


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

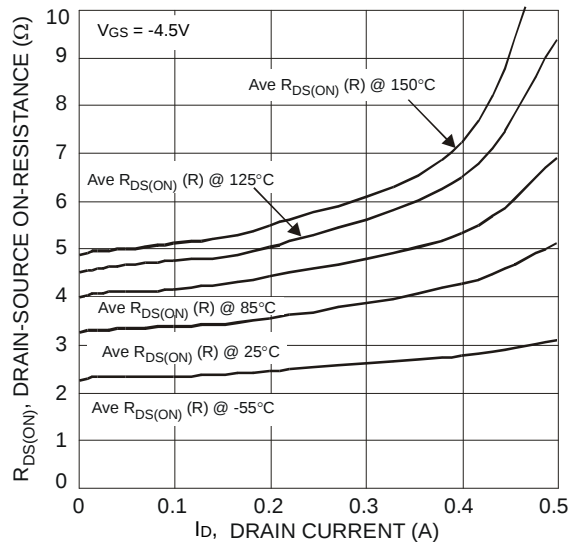


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

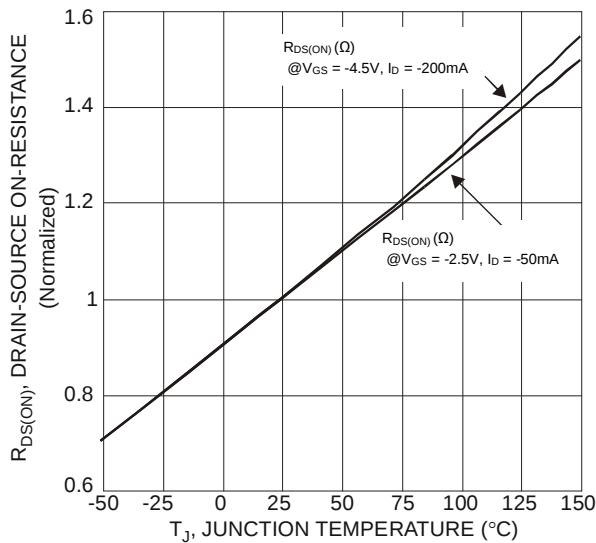


Fig. 5 On-Resistance Variation with Temperature

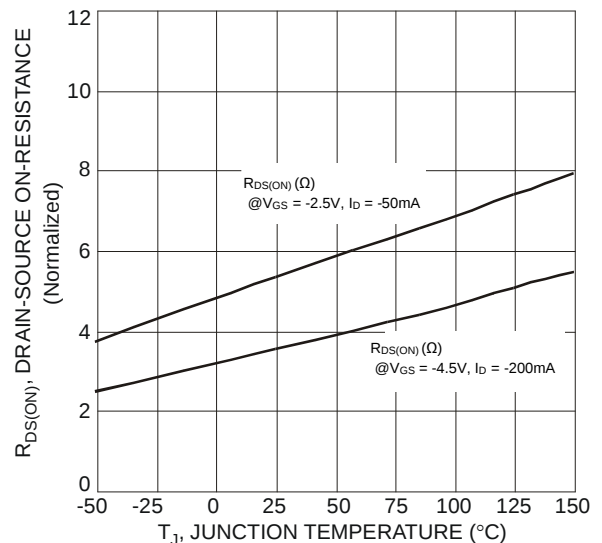


Fig. 6 On-Resistance vs. Temperature

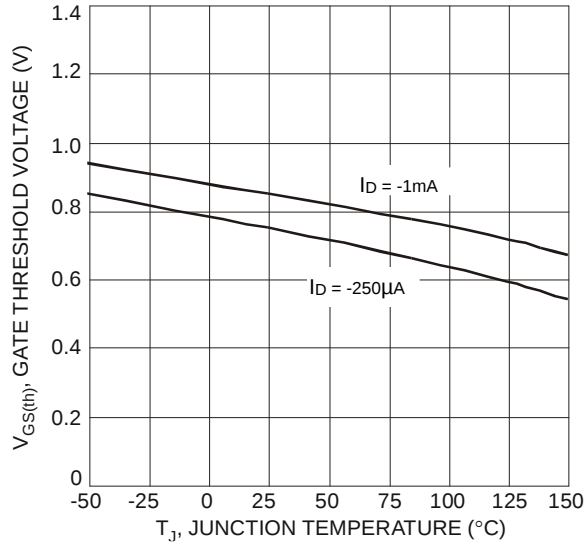


Fig. 7 Gate Threshold Variation vs. Junction Temperature

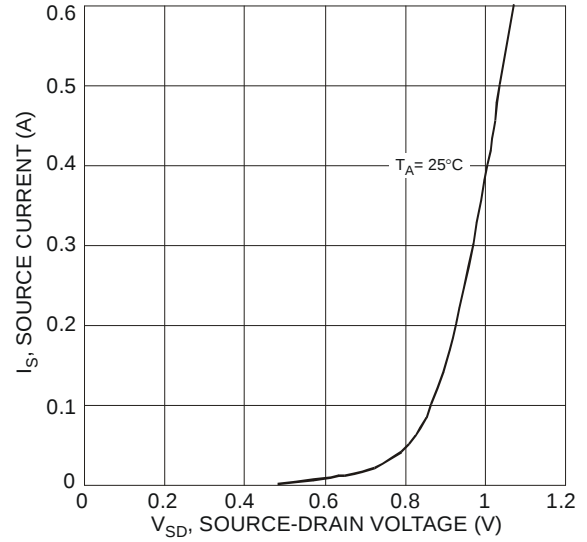


Fig. 8 Diode Forward Voltage vs. Current

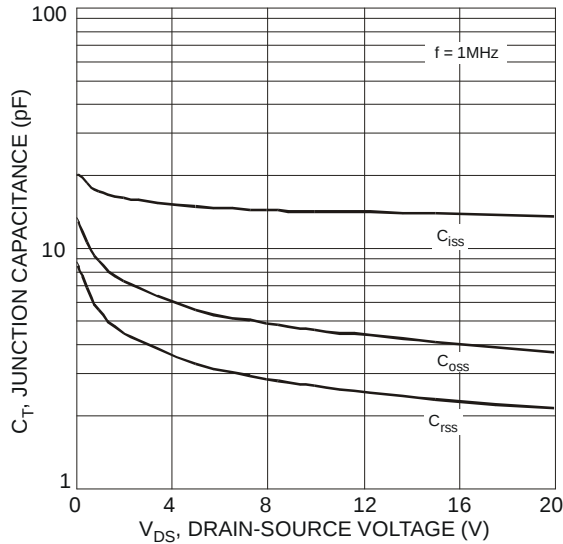


Fig. 9 Typical Junction Capacitance

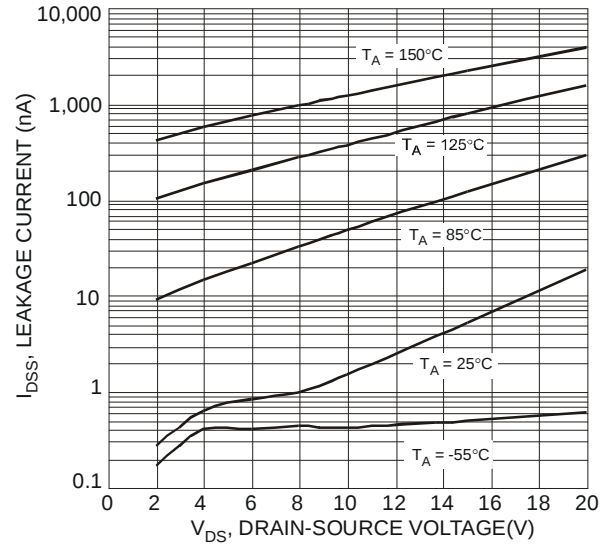


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

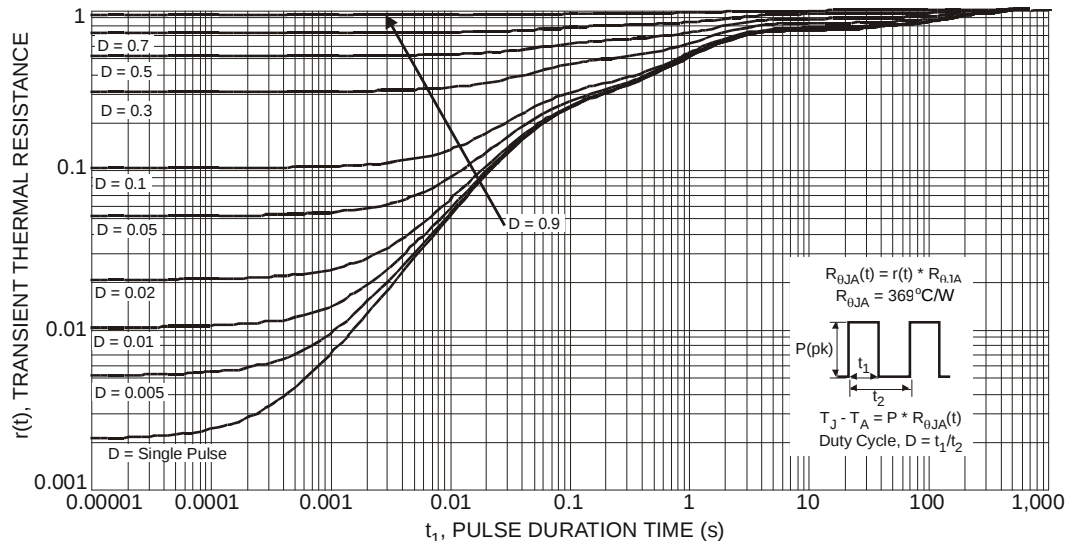
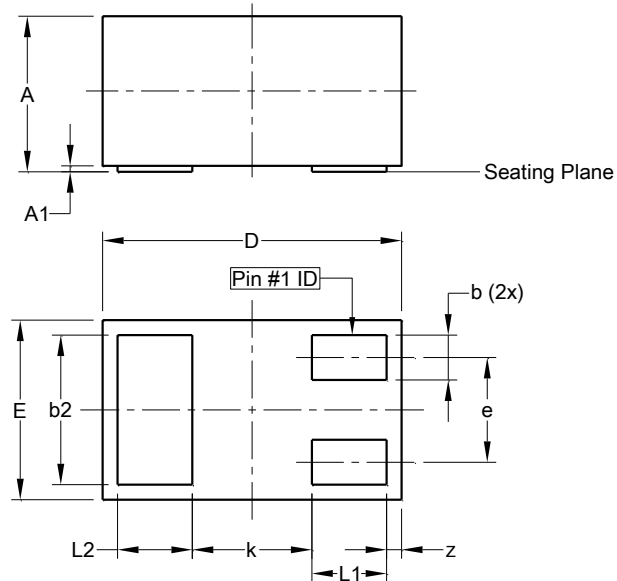


Fig. 11 Transient Thermal Response

## Package Outline Dimensions

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

**X2-DFN1006-3**

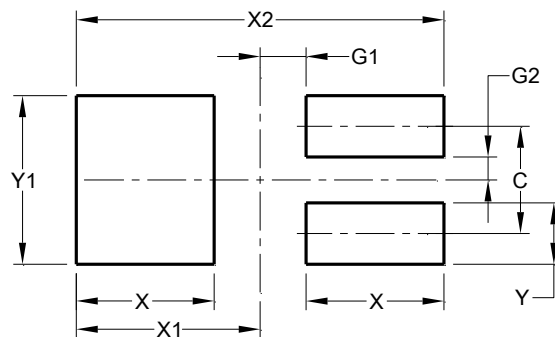


| X2-DFN1006-3         |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | —    | 0.40 | —    |
| A1                   | 0.00 | 0.05 | 0.03 |
| b                    | 0.10 | 0.20 | 0.15 |
| b2                   | 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 |
| 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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