

Product Summary

| BV _{DSS} | R _{DS(ON)} | I _D T _A = +25°C (Note 5) |
|-------------------|--------------------------------|--|
| 20V | 175mΩ @ V _{GS} = 4.5V | 1.30A |
| | 240mΩ @ V _{GS} = 2.5V | 1.11A |
| | 360mΩ @ V _{GS} = 1.8V | 0.91A |
| | 500mΩ @ V _{GS} = 1.5V | 0.82A |

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

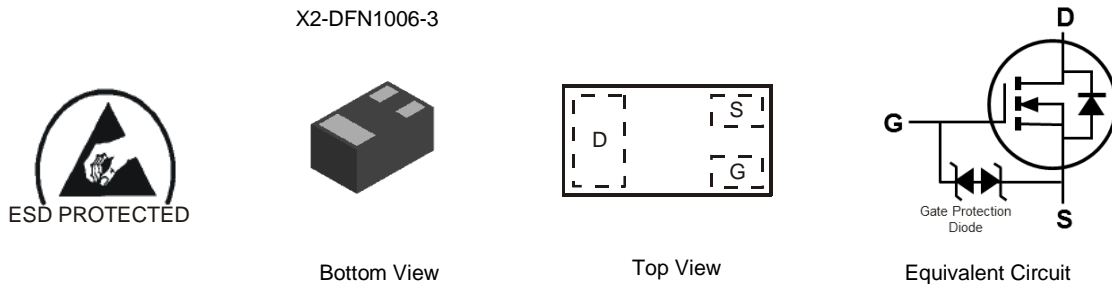
- Load Switch

Features

- Footprint of Just 0.6mm² – Thirteen Times Smaller Than SOT23
- 0.4mm Profile – Ideal for Low Profile Applications
- Low Gate Threshold Voltage
- Fast Switching Speed
- ESD Protected Gate**
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**

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
- Terminals: Finish – NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.001 grams (Approximate)



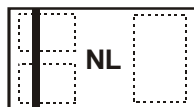
Ordering Information (Note 4)

| Part Number | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|----------------|---------|--------------------|-----------------|-------------------|
| DMN2300UFB4-7B | NL | 7 | 8 | 10,000 |

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 - 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.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

DMN2300UFB4-7B



Top View
Bar Denotes Gate and Source Side

NL = Product Type Marking Code

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|---|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage | | | V _{DSS} | 20 | V |
| Gate-Source Voltage | | | V _{GSS} | ±8 | V |
| Continuous Drain Current (Note 5) V _{GS} = 4.5V | Steady State | T _A = +25°C | I _D | 1.30 | A |
| | | T _A = +85°C | | 0.96 | |
| Pulsed Drain Current (Note 6) | | | I _{DM} | 6 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation (Note 5) | P _D | 500 | mW |
| Thermal Resistance, Junction to Ambient @T _A = +25°C | R _{θJA} | 250 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|------|------|------|------|--|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 20 | — | — | V | V _{GS} = 0V, I _D = 10μA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | — | — | 1 | μA | V _{DS} = 20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | 10 | μA | V _{GS} = ±8V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 0.45 | — | 0.95 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | — | 175 | mΩ | V _{GS} = 4.5V, I _D = 1A |
| | | — | — | 240 | | V _{GS} = 2.5V, I _D = 750mA |
| | | — | — | 360 | | V _{GS} = 1.8V, I _D = 500mA |
| | | — | — | 500 | | V _{GS} = 1.5V, I _D = 200mA |
| Forward Transfer Admittance | Y _{fs} | 40 | — | — | mS | V _{DS} = 3V, I _D = 30mA |
| Diode Forward Voltage | V _{SD} | — | 0.7 | 1.2 | V | V _{GS} = 0V, I _S = 300mA |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | C _{iss} | — | 67.6 | — | pF | V _{DS} = 20V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 9.7 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 7.5 | — | pF | |
| Gate Resistance | R _g | — | 70 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge | Q _g | — | 1.6 | — | nC | V _{GS} = 4.5V, V _{DS} = 15V, I _D = 1A |
| Gate-Source Charge | Q _{gs} | — | 0.2 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 0.2 | — | nC | |
| Turn-On Delay Time | t _{D(ON)} | — | 3.5 | — | ns | V _{DS} = 10V, I _D = 1A V _{GS} = 10V, R _G = 6Ω |
| Turn-On Rise Time | t _R | — | 2.8 | — | ns | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 38 | — | ns | |
| Turn-Off Fall Time | t _F | — | 13 | — | ns | |

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
 - Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.
 - Short duration pulse test used to minimize self-heating effect.

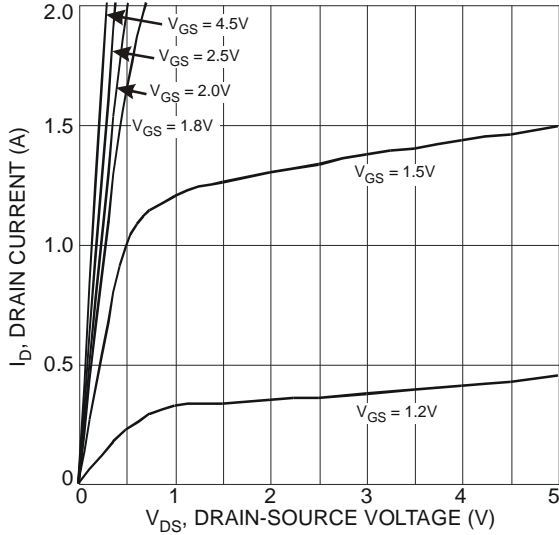


Figure 1 Typical Output Characteristic

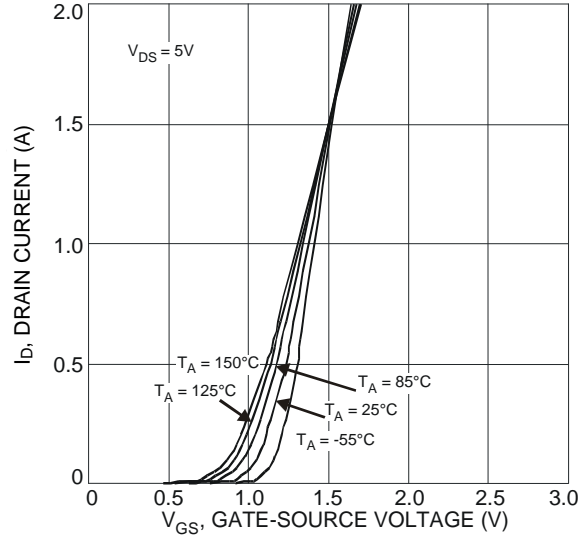


Figure 2 Typical Transfer Characteristic

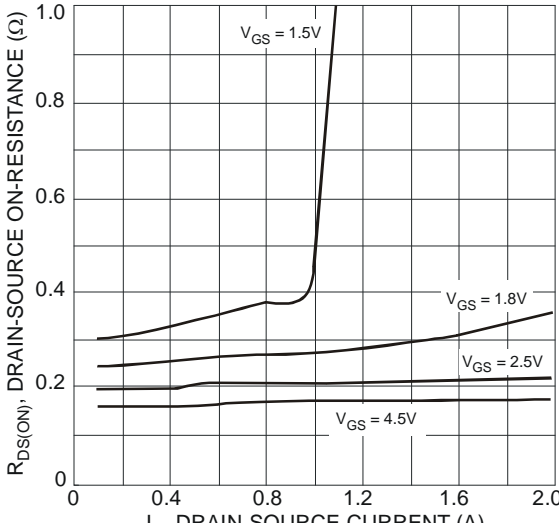


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

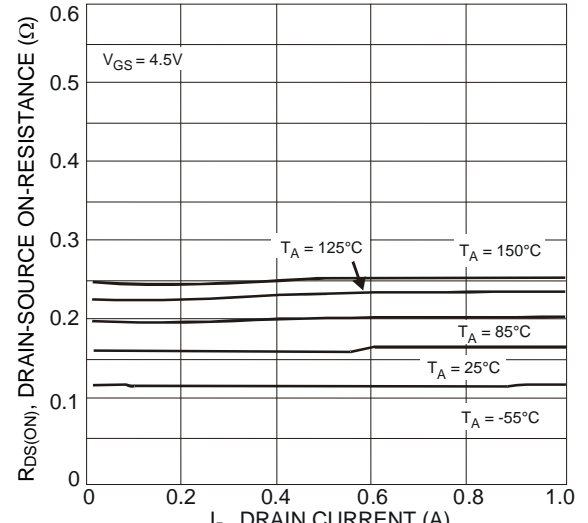


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

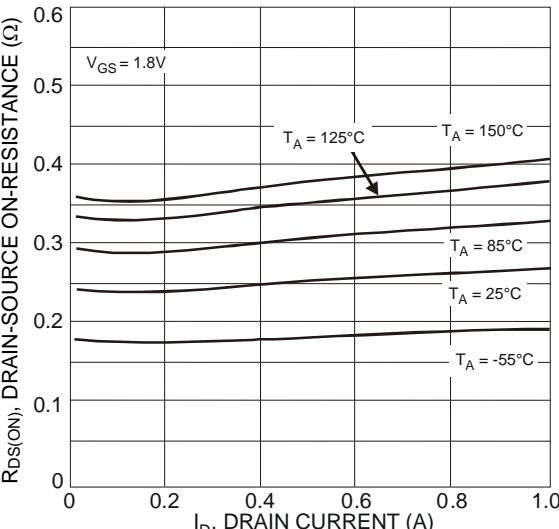


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

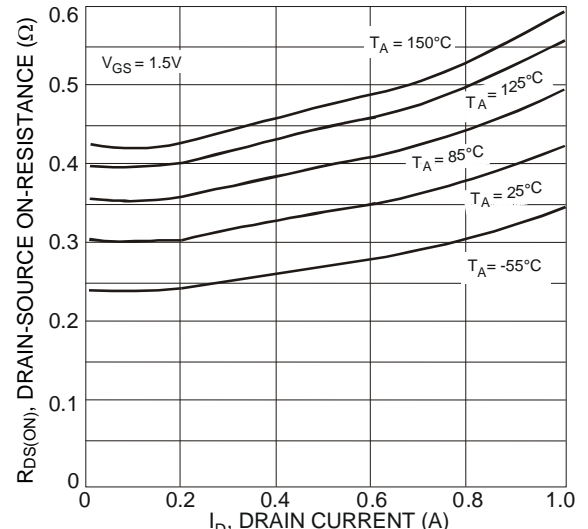


Figure 6 Typical On-Resistance vs. Drain Current and Temperature

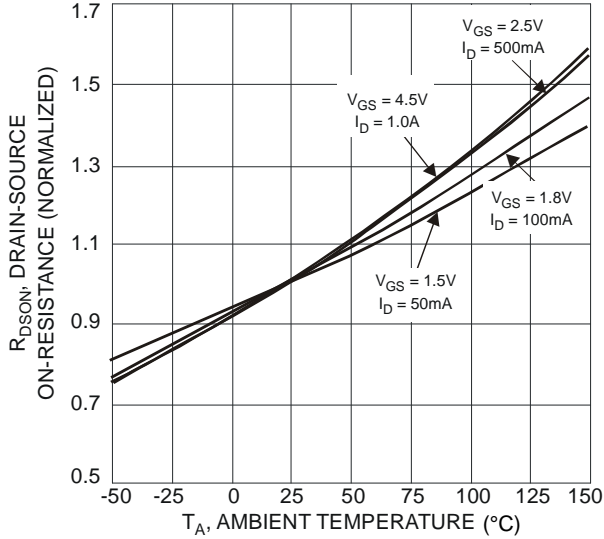


Figure 7 On-Resistance Variation with Temperature

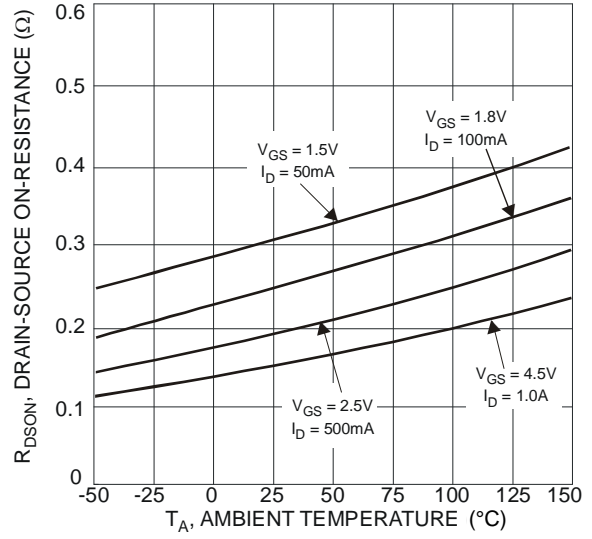


Figure 8 On-Resistance Variation with Temperature

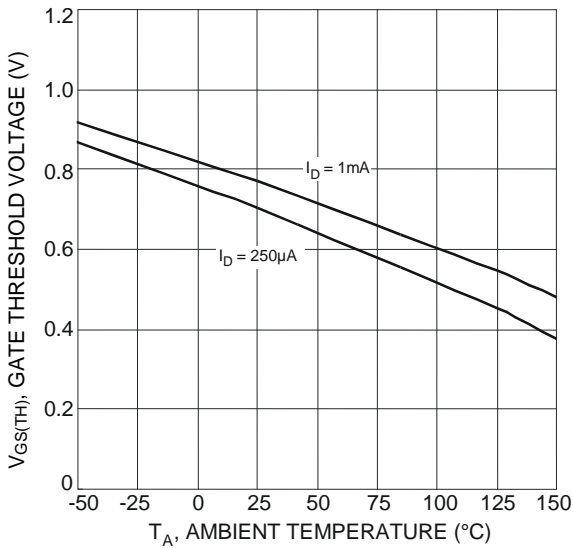


Figure 9 Gate Threshold Variation vs. Ambient Temperature

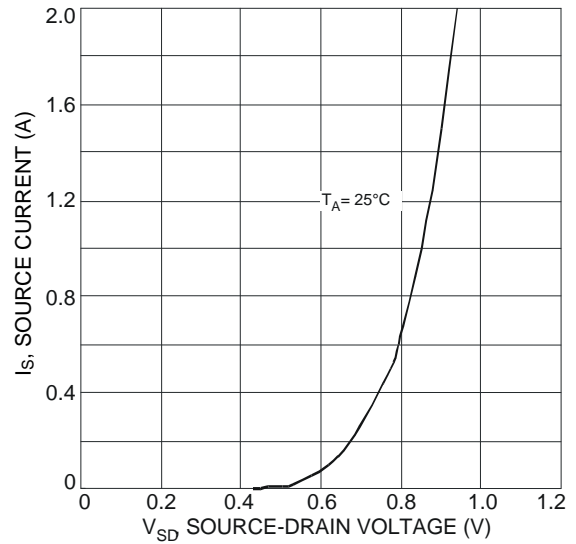


Figure 10 Diode Forward Voltage vs. Current

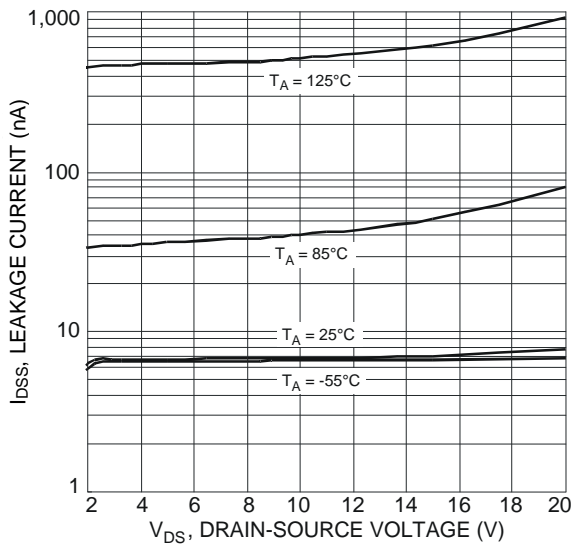


Figure 11 Typical Leakage Current vs. Drain-Source Voltage

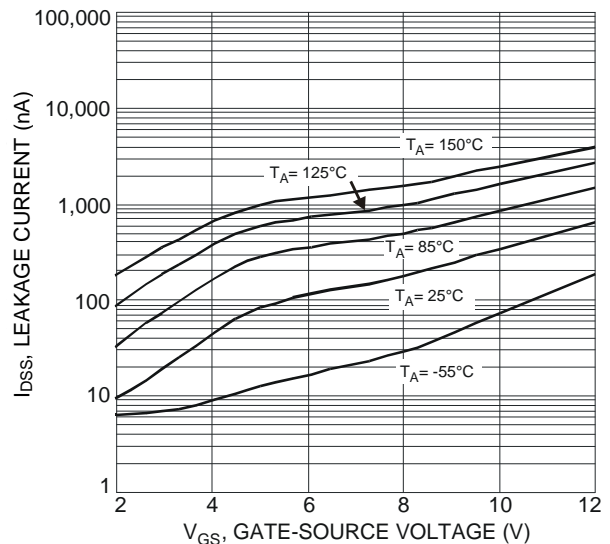


Figure 12 Leakage Current vs. Gate-Source Voltage

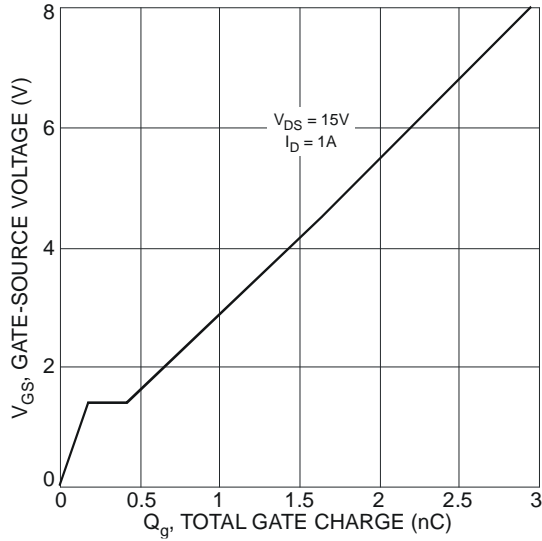


Figure 13 Gate-Charge Characteristics

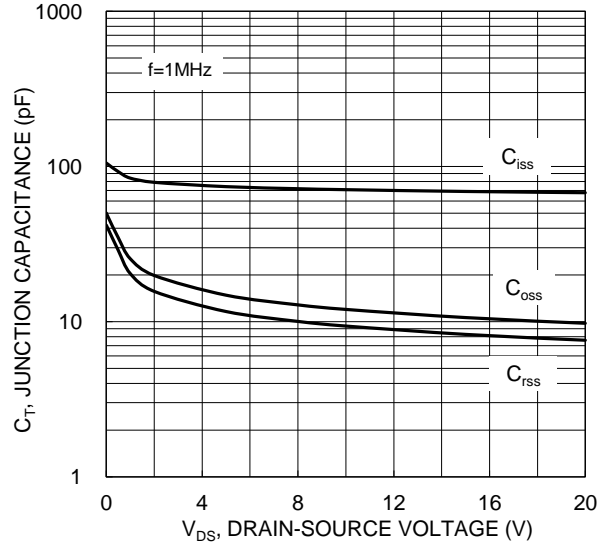


Figure 14 Typical Junction Capacitance

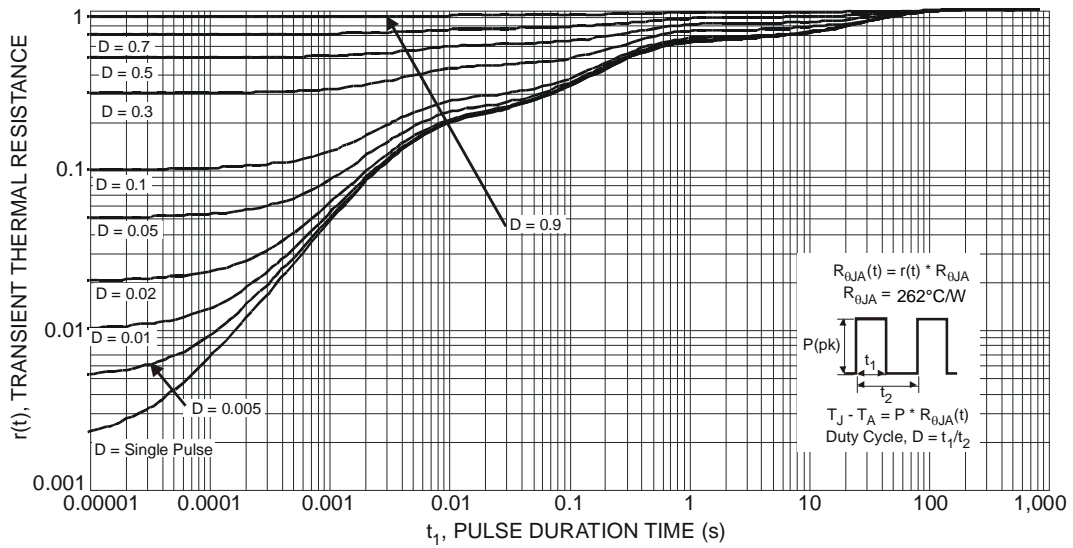
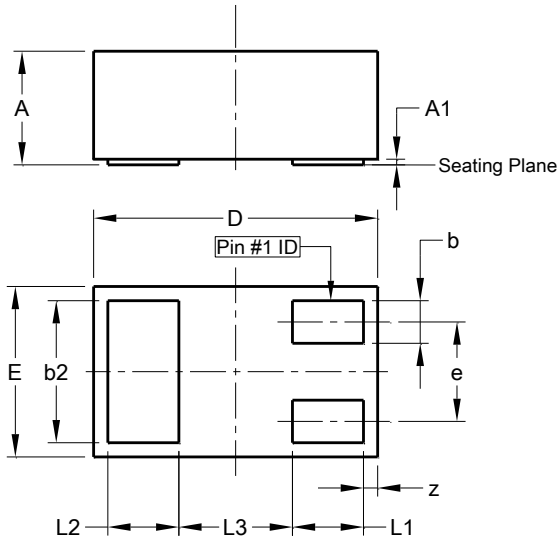


Figure 15 Transient Thermal Response

Package Outline Dimensions

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

X2-DFN1006-3

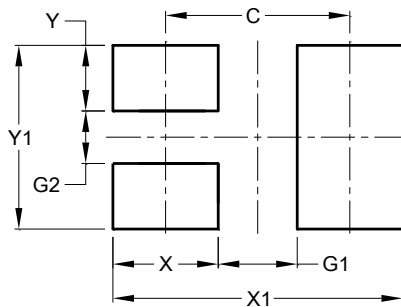


| X2-DFN1006-3 | | | |
|----------------------|------|------|------|
| Dim | Min | Max | Typ |
| A | — | 0.40 | — |
| A1 | 0.00 | 0.05 | 0.03 |
| b | 0.10 | 0.20 | 0.15 |
| b2 | 0.45 | 0.55 | 0.50 |
| D | 0.95 | 1.05 | 1.00 |
| E | 0.55 | 0.65 | 0.60 |
| e | - | - | 0.35 |
| L1 | 0.20 | 0.30 | 0.25 |
| L2 | 0.20 | 0.30 | 0.25 |
| 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.

X2-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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