## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | $I_D$ $T_A$ = +25°C |
|---|---|---|
| -50V | 6Ω @ $V_{GS}$ = -4 V | -200mA |
| | 8Ω @ $V_{GS}$ = -2.5V | -160mA |

## Description and Applications

This new generation MOSFET is 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.

- DC-DC Converters
- Power Management Functions
- Battery Operated Systems and Solid-State Relays

## Features and Benefits

- Low On-Resistance
- ESD Protected Gate
- Low Input/Output Leakage
- Fast Switching Speed
- **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-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative.**
  **https://www.diodes.com/quality/product-definitions/**

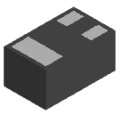
## Mechanical Data

- 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 over Copper Leadframe; Solderable per MIL-STD-202, Method 208 e4
- Terminal Connections: See Diagram
- Weight: 0.001 grams (Approximate)

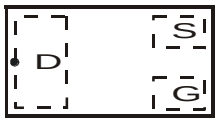


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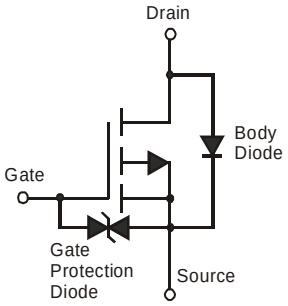
X1-DFN1006-3



Bottom View




Top View
Internal Schematic




Equivalent Circuit

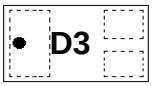
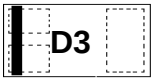
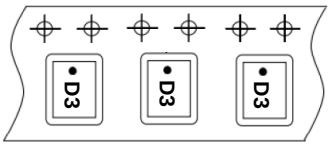
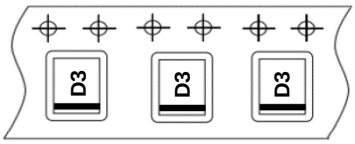
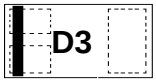
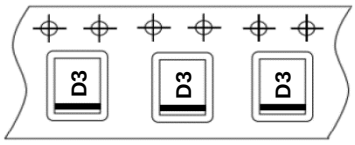
## Ordering Information

| Part Number | Package | Packing | |
|---|---|---|---|
| | | Qty. | Carrier |
| DMP56D0UFB-7 | X1-DFN1006-3 | 3,000 | Tape & Reel |
| DMP56D0UFB-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/.


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## Marking Information

| | |
|---|---|
| **DMP56D0UFB-7** |  Top View Dot Denotes Drain Side<br>From date code 1527 (YYWW), this changes to:<br> Top View Bar Denotes Gate and Source Side<br><br> |
| **DMP56D0UFB-7B** |  Top View Bar Denotes Gate and Source Side<br>D3 = Part Marking Code<br> |

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

| Characteristic | | | Symbol | Value | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | -50 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±8 | V |
| Drain Current (Note 5) | Steady | $T_A$ = +25°C | $I_D$ | -200 | mA |
| Pulsed Drain Current (Note 6) | | | $I_{DM}$ | -700 | mA |

## Thermal Characteristics

| Characteristic | Symbol | Value | Units |
|---|---|---|---|
| Total Power Dissipation (Note 5) | $P_D$ | 425 | mW |
| Thermal Resistance, Junction to Ambient @$T_A$ = +25°C (Note 5) | $R_{\theta JA}$ | 275 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

Notes: 5. Device mounted on FR-4 PCB. t ≤5 sec.
6. Pulse width ≤10µS, Duty Cycle ≤1%.


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## 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 | $BV_{DSS}$ | -50 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | -10 | µA | $V_{DS}$ = -50V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±1 | µA | $V_{GS}$ = ±8V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | -0.5 | — | -1.2 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | —— | 4.6<br>6 | 6<br>8 | Ω | $V_{GS}$ = -4.0V, $I_D$ = -100mA<br>$V_{GS}$ = -2.5V, $I_D$ = -80mA |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | 100 | — | — | mS | $V_{DS}$ = -5V, $I_D$ = -100mA |
| Diode Forward Voltage (Note 7) | $V_{SD}$ | — | -0.8 | -1.2 | V | $V_{GS}$ = 0V, $I_S$ = -100mA |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 50.54 | — | pF | $V_{DS}$ = -25V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 3.49 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 2.42 | — | pF | |
| Gate Resistance | $R_G$ | — | 201 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1.0MHz |
| Total Gate Charge $V_{GS}$ = 4.5V | $Q_g$ | — | 0.58 | — | nC | $V_{DS}$ = -25V, $I_D$ = -100mA |
| Gate-Source Charge | $Q_{gs}$ | — | 0.09 | — | nC | |
| Gate-Drain Charge | $Q_{gd}$ | — | 0.14 | — | nC | |
| Turn-On Delay Time | $t_{D(on)}$ | — | 4.46 | — | nS | $V_{DD}$ = -30V, $I_D$ = -0.27A, $V_{GEN}$ = -4V, $R_{GEN}$ = 6Ω |
| Turn-On Rise Time | $t_r$ | — | 6.63 | — | nS | |
| Turn-Off Delay Time | $t_{D(off)}$ | — | 21.9 | — | nS | |
| Turn-Off Fall Time | $t_f$ | — | 15.0 | — | nS | |

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.


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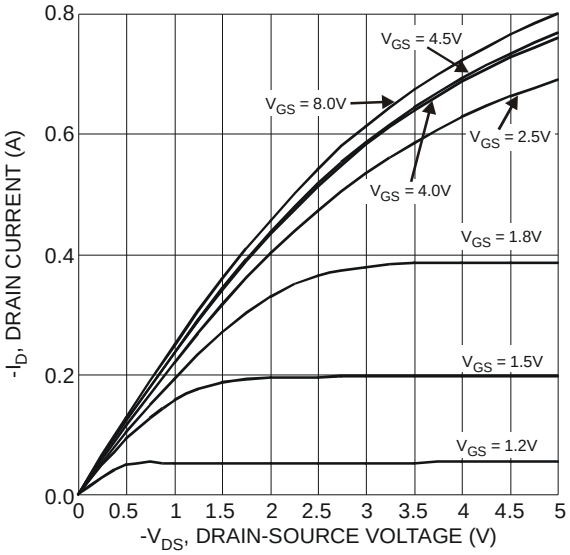



Figure 1 Typical Output Characteristics

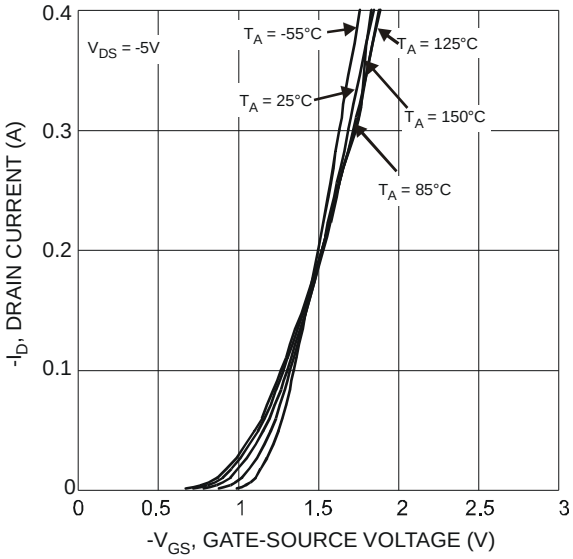



Figure 2 Typical Transfer Characteristics

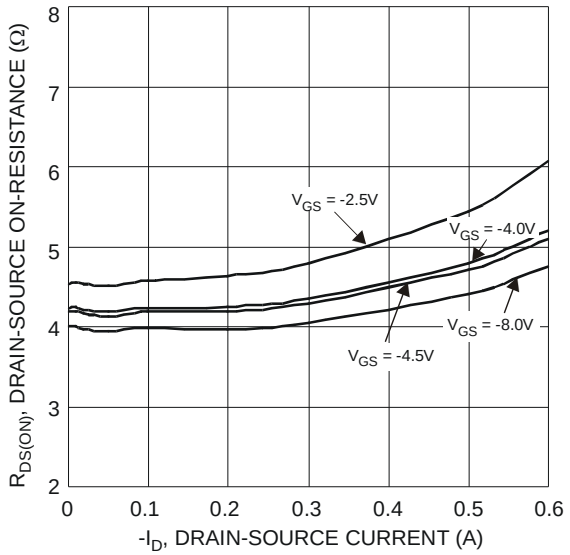



Figure 3 Typical On-Resistnace vs. Drain Current and Gate Voltage

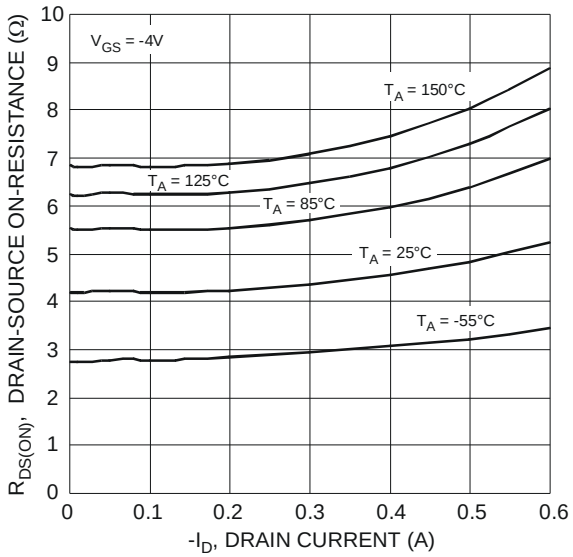



Figure 4 Typical On-Resistance vs. Drain Current and Temperature

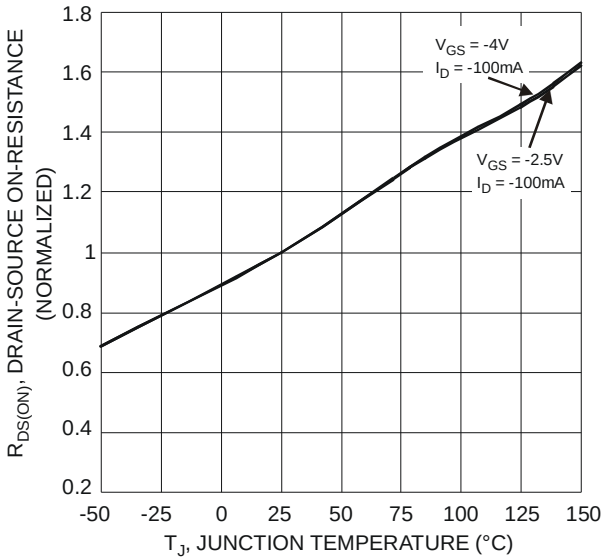



Figure 5 On-Resistance Variation with Temperature

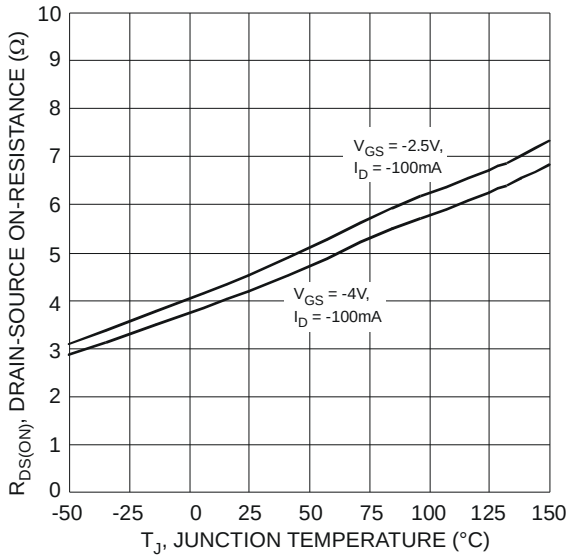



Figure 6 On-Resistance Variation with Temperature


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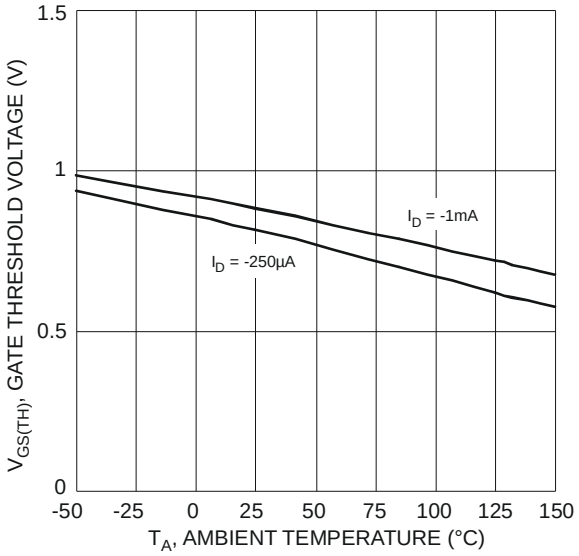



Figure 7 Gate Threshold Variation vs. Ambient Temperature

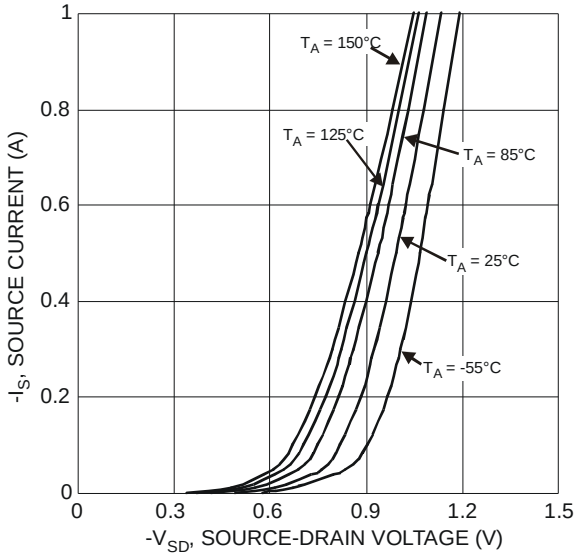



Figure 8 Diode Forward Voltage vs. Current

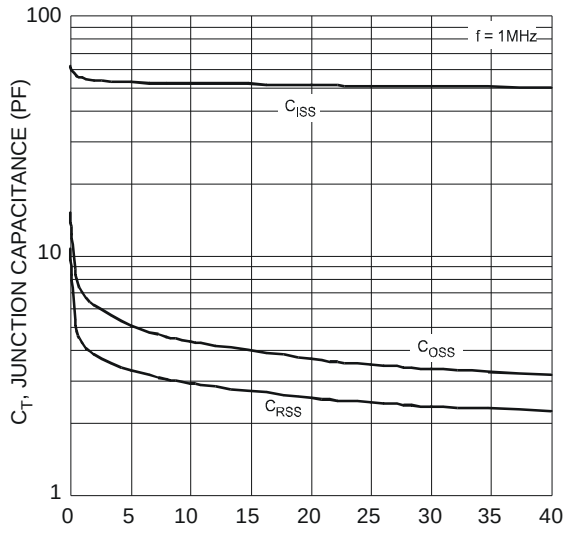



Figure 9 Typical Junction Capacitance

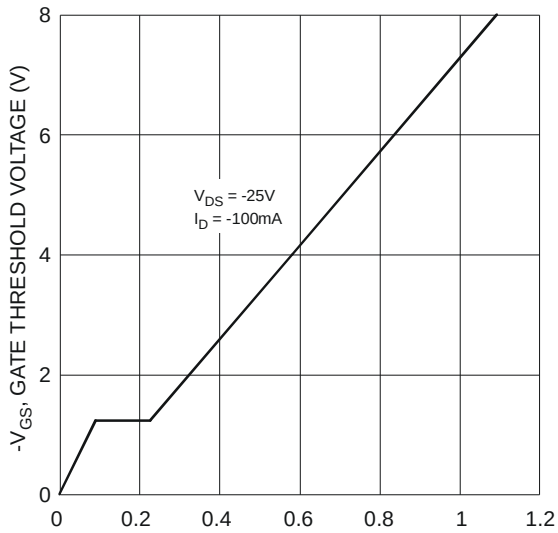
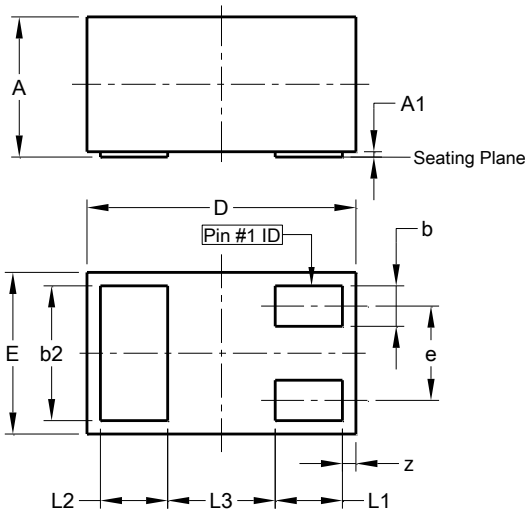



Figure 10 Gate Charge Characteristics


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## Package Outline Dimensions

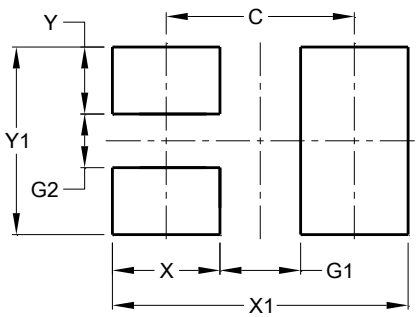
Please see http://www.diodes.com/package-outlines.html for the latest version.




| 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.




| 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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