# 20V N-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ | $I_D$ max $T_A$ = 25°C (Note 4) |
|---|---|---|
| 20V | 175mΩ @ $V_{GS}$= 4.5V | 1.30A |
| | 240mΩ @ $V_{GS}$= 2.5V | 1.11A |
| | 360mΩ @ $V_{GS}$= 1.8V | 0.91A |

## Features and Benefits

- Footprint of just 0.6mm$^2$ – thirteen times smaller than SOT23
- 0.5mm profile – ideal for low profile applications
- On resistance <200mΩ @ $V_{GS}$ = 4.5V
- Low Gate Threshold Voltage
- Fast Switching Speed
- **"Lead Free", RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **ESD Protected Gate 2KV**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Description and Applications

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.

- Load switch

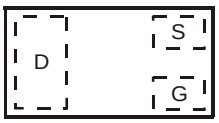
## Mechanical Data

- Case: 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
- Weight: 0.001 grams (approximate)

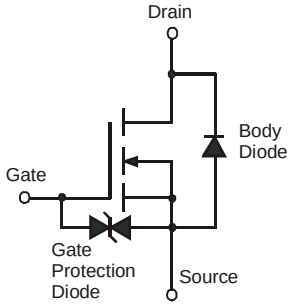
ESD PROTECTED TO 2kV

DFN1006-3

Bottom View




Top View
Internal Schematic




Equivalent Circuit

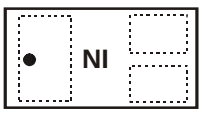
## Ordering Information (Note 3)

| Part Number | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|
| DMN2300UFB-7 | NI | 7 | 8 | 3,000 |
| DMN2300UFB-7B | NI | 7 | 8 | 10,000 |

Notes:
1. No purposefully added lead
2. Diodes Inc's "Green" policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com.

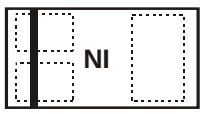
## Marking Information

DMN2300UFB-7




Top View
Dot Denotes
Drain Side

DMN2300UFB-7B




Top View
Bar Denotes Gate
and Source Side

NI = 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 | Steady State | $T_A$ = 25°C (Note 4)<br>$T_A$ = 85°C (Note 4)<br>$T_A$ = 25°C (Note 5) | $I_D$ | 1.32<br>0.94<br>1.78 | A |
| Pulsed Drain Current (Note 6) | | | $I_{DM}$ | 8 | A |

## Thermal Characteristics @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation (Note 4) | $P_D$ | 0.468 | W |
| Power Dissipation (Note 5) | $P_D$ | 1.2 | W |
| Thermal Resistance, Junction to Ambient (Note 4) | $R_{\theta JA}$ | 267 | °C/W |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 104 | °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, $I_D$ = 300mA |
| | | - | - | 240 | | $V_{GS}$ = 2.5V, $I_D$ = 250mA |
| | | - | - | 360 | | $V_{GS}$ = 1.8V, $I_D$ = 100mA |
| 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 | $C_{iss}$ | - | 67.62 | - | pF | $V_{DS}$ = 20V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | - | 9.74 | - | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 7.58 | - | pF | |
| Gate Resistance | $R_g$ | - | 68.51 | - | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge | $Q_g$ | - | 0.89 | - | nC | $V_{GS}$ = 4.5V, $V_{DS}$ = 10V, $I_D$ = 1A |
| Gate-Source Charge | $Q_{gs}$ | - | 0.14 | - | nC | |
| Gate-Drain Charge | $Q_{gd}$ | - | 0.16 | - | nC | |
| Turn-On Delay Time | $t_{D(on)}$ | - | 4.92 | - | ns | $V_{DS}$ = 10V, $I_D$ = 1A<br>$V_{GS}$ = 4.5V, $R_G$ = 6Ω |
| Turn-On Rise Time | $t_r$ | - | 6.93 | - | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | - | 21.71 | - | ns | |
| Turn-Off Fall Time | $t_f$ | - | 10.62 | - | ns | |

Notes: 4. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout
5. Device mounted on FR-4 substrate PC board, 2oz copper, with 25mm X 25mm square copper plate
6. Device mounted on minimum recommended pad layout test board, 10µs pulse duty cycle = 1%.
7. Short duration pulse test used to minimize self-heating effect.

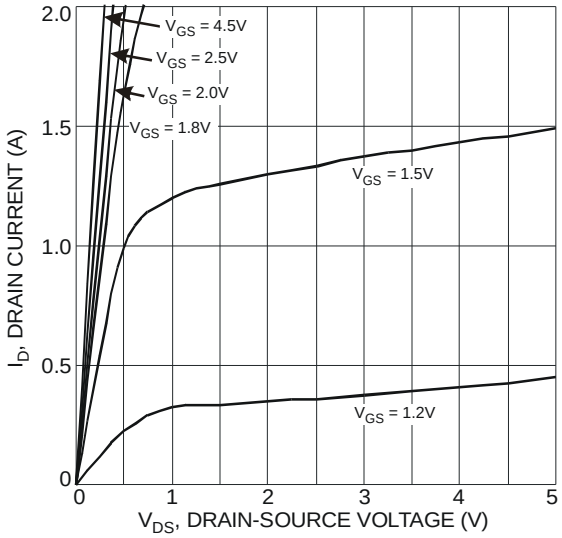



Fig. 1 Typical Output Characteristic

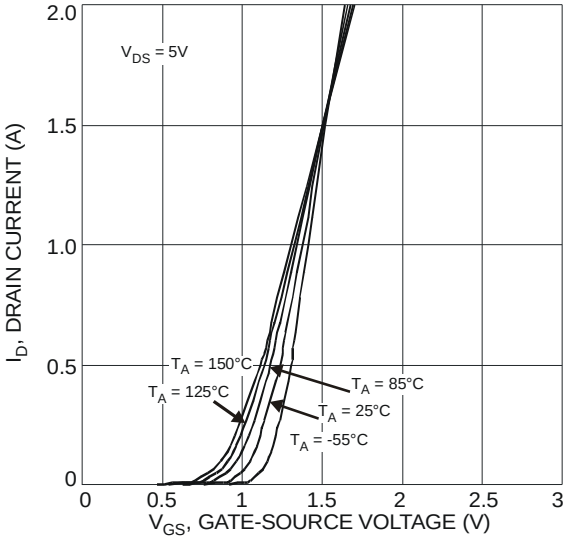



Fig. 2 Typical Transfer Characteristic

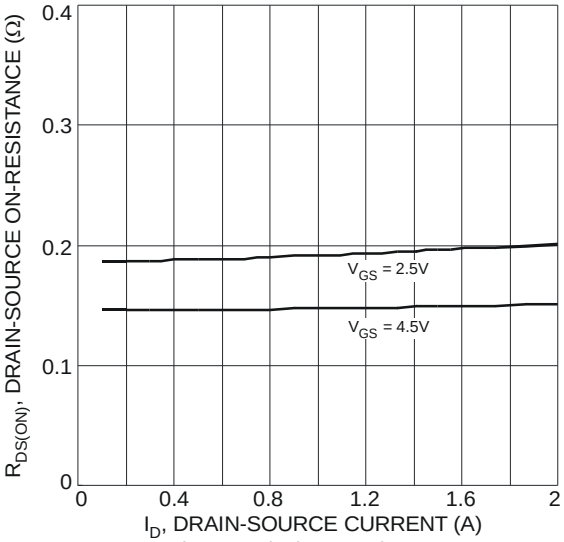



Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

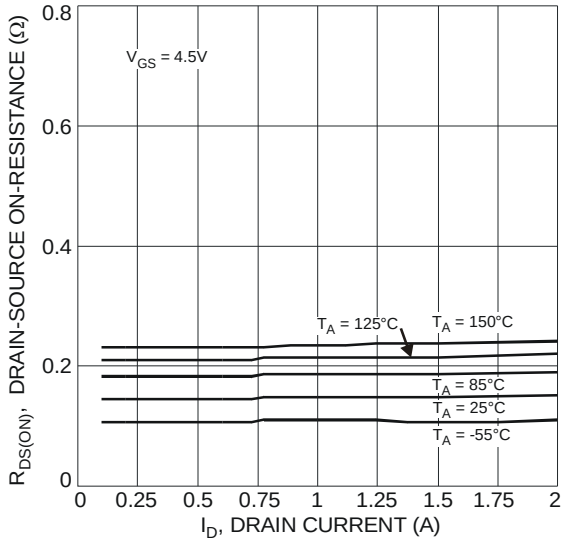



Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

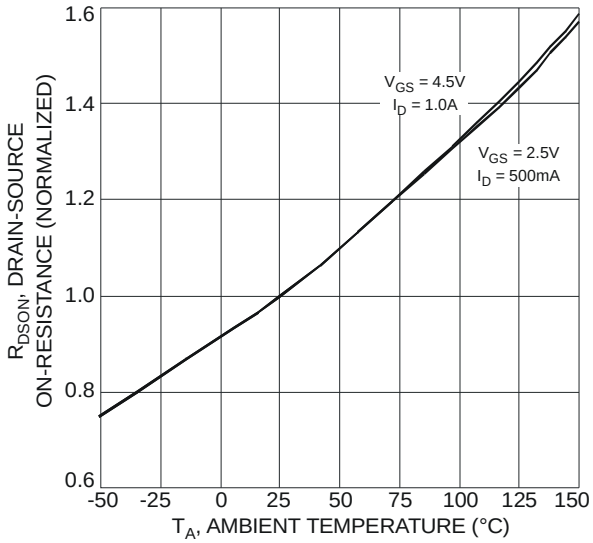



Fig. 5 On-Resistance Variation with Temperature

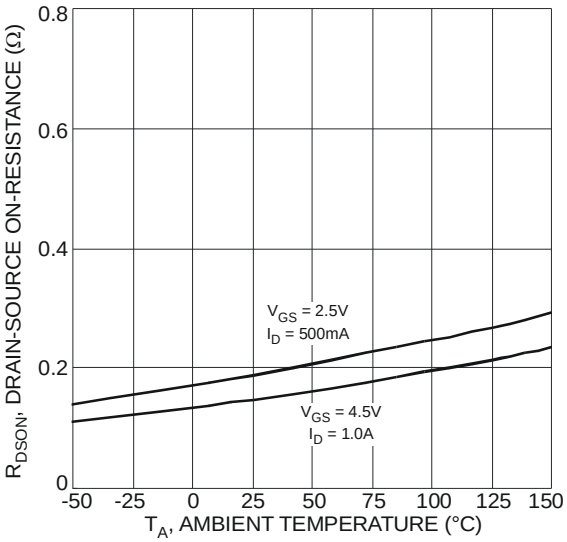



Fig. 6 On-Resistance Variation with Temperature

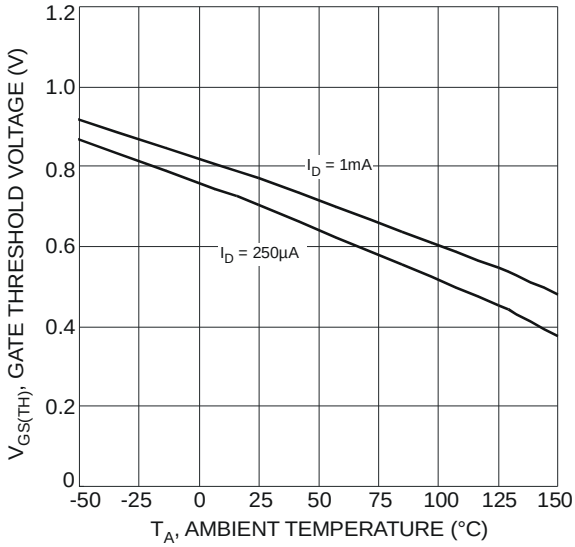



Fig. 7 Gate Threshold Variation vs. Ambient Temperature

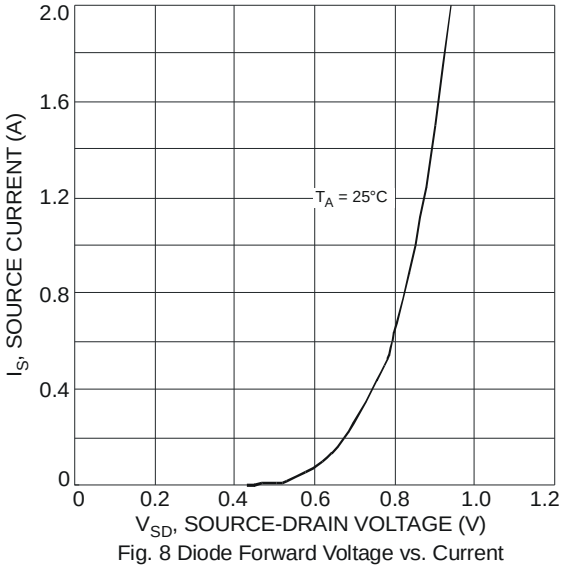



Fig. 8 Diode Forward Voltage vs. Current

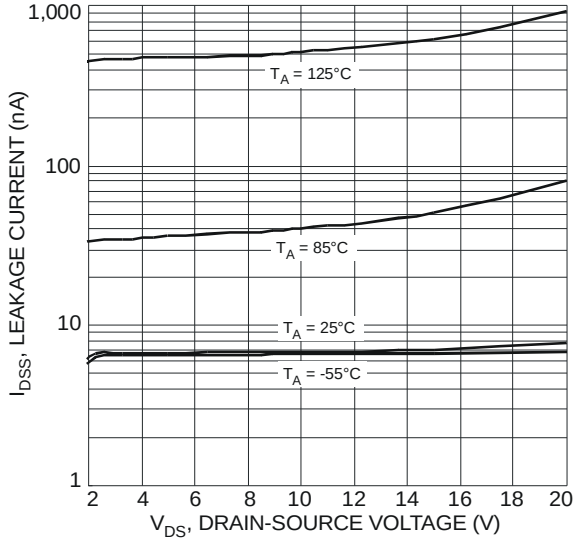



Fig. 9 Typical Leakage Current
vs. Drain-Source Voltage

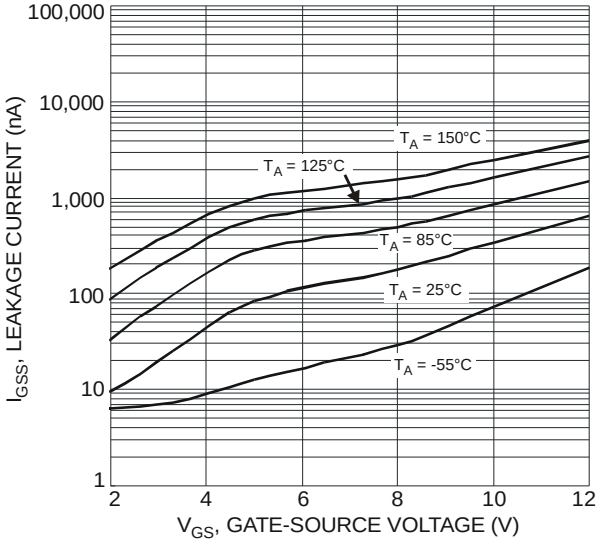



Fig.10 Leakage Current vs. Gate-Source Voltage

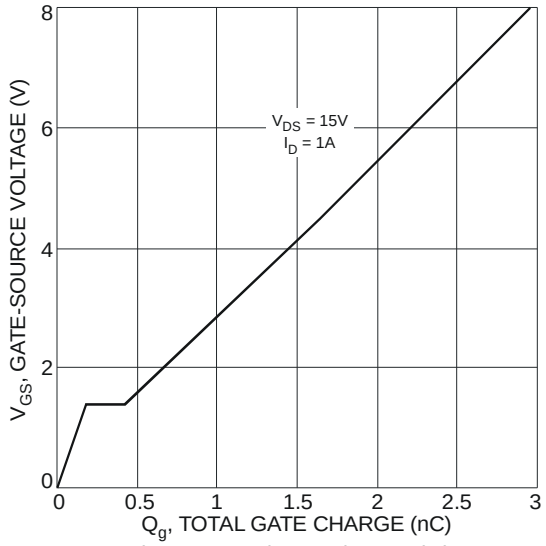



Fig. 11 Gate-Charge Characteristics

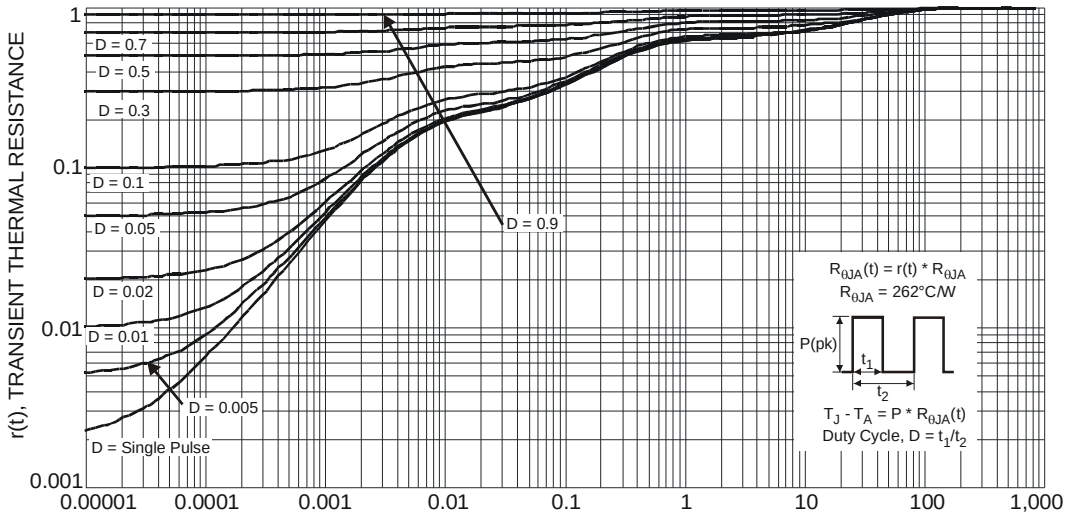
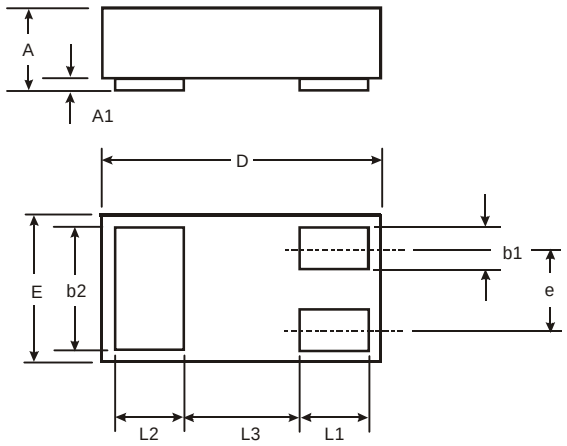


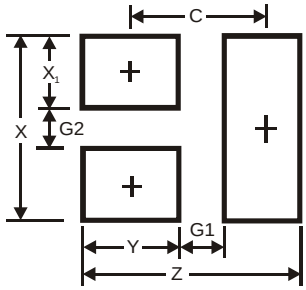

Fig. 12 Transient Thermal Response

## Package Outline Dimensions




| DFN1006-3 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.47 | 0.53 | 0.50 |
| **A1** | 0 | 0.05 | 0.03 |
| **b1** | 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 |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout




| Dimensions | Value (in mm) |
|---|---|
| **Z** | 1.1 |
| **G1** | 0.3 |
| **G2** | 0.2 |
| **X** | 0.7 |
| **X1** | 0.25 |
| **Y** | 0.4 |
| **C** | 0.7 |

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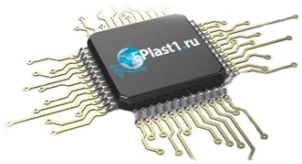


**Как с нами связаться**

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