

**20V N-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ max $T_A = 25^\circ C$ (Notes 4)
20V	175m $\Omega$ @ $V_{GS} = 4.5V$	1.30A
	240m $\Omega$ @ $V_{GS} = 2.5V$	1.11A
	360m $\Omega$ @ $V_{GS} = 1.8V$	0.91A

**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

**Features and Benefits**

- Footprint of just 0.6mm<sup>2</sup> – thirteen times smaller than SOT23
- 0.4mm profile – ideal for low profile applications
- 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

**Mechanical Data**

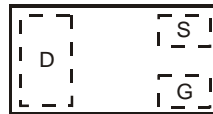
- Case: DFN1006H4-3
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.001 grams (approximate)



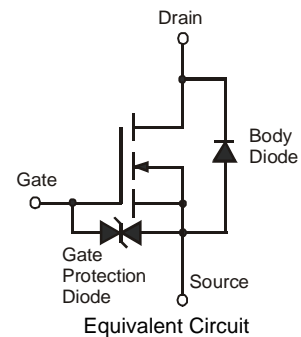
DFN1006H4-3



Bottom View



Top View  
Internal Schematic



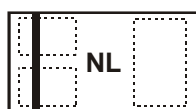
**Ordering Information** (Note 3)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN2300UFB4-7B	NL	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**

DMN2300UFB4-7B



Top View  
Bar Denotes Gate  
and Source Side

NL = Product Type Marking Code

**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	20	V
Gate-Source Voltage			$V_{GSS}$	$\pm 8$	V
Continuous Drain Current (Note 4)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	1.3	A
		$T_A = 85^\circ\text{C}$		0.96	
Pulsed Drain Current (Note 5)			$I_{DM}$	6	A

**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 4)	$P_D$	0.47	W
Thermal Resistance, Junction to Ambient @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	258	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	20	-	-	V	$V_{GS} = 0V, I_D = 10\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = 25^\circ\text{C}$	$I_{DSS}$	-	-	1	$\mu\text{A}$	$V_{DS} = 20V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	-	-	10	$\mu\text{A}$	$V_{GS} = \pm 8V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	0.45	-	0.95	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	-	-	175	m $\Omega$	$V_{GS} = 4.5V, I_D = 300\text{mA}$
		-	-	240		$V_{GS} = 2.5V, I_D = 250\text{mA}$
		-	-	360		$V_{GS} = 1.8V, I_D = 100\text{mA}$
Forward Transfer Admittance	$ Y_{fs} $	40	-	-	mS	$V_{DS} = 3V, I_D = 30\text{mA}$
Diode Forward Voltage	$V_{SD}$	-	0.7	1.2	V	$V_{GS} = 0V, I_S = 300\text{mA}$
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	$C_{iss}$	-	64.3	-	pF	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	-	6.1	-	pF	
Reverse Transfer Capacitance	$C_{rss}$	-	4.5	-	pF	
Gate Resistance	$R_g$	-	70	-	$\Omega$	$V_{DS} = 0V, V_{GS} = 0V, f = 1\text{MHz}$
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	$V_{DS} = 10V, I_D = 1A, V_{GS} = 10V, R_G = 6\Omega$
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, 10 $\mu\text{s}$  pulse duty cycle = 1%.
  - Short duration pulse test used to minimize self-heating effect.

**DMN2300UFB4**

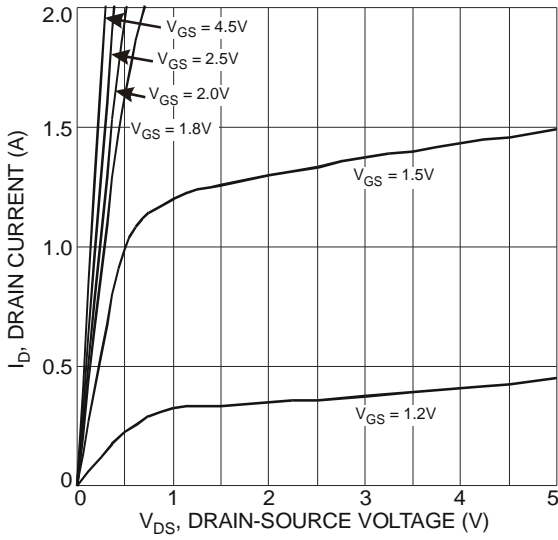


Fig. 1 Typical Output Characteristic

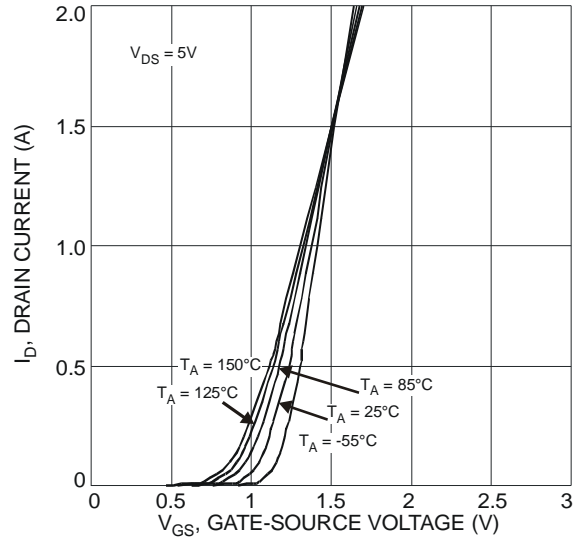


Fig. 2 Typical Transfer Characteristic

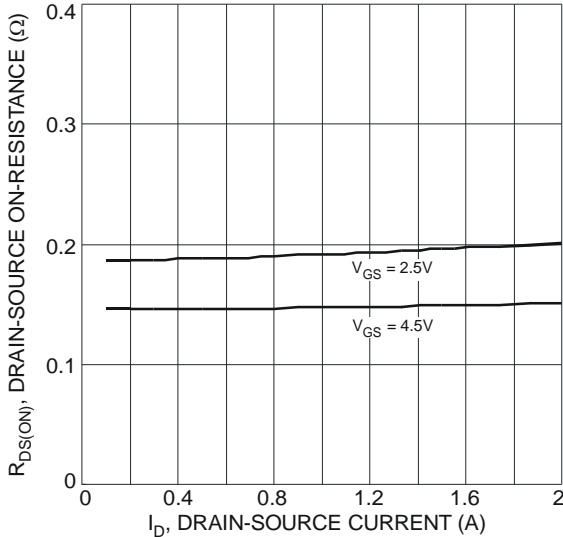


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

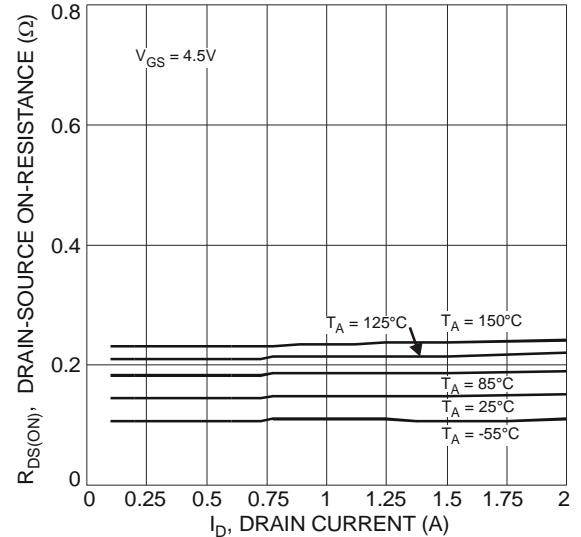


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

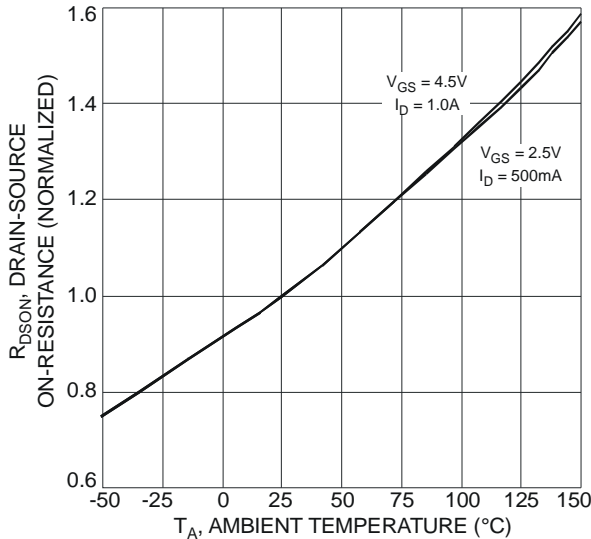


Fig. 5 On-Resistance Variation with Temperature

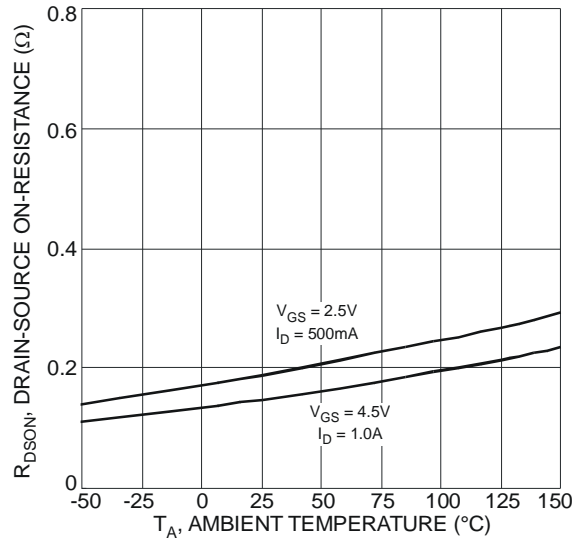


Fig. 6 On-Resistance Variation with Temperature

**DMN2300UFB4**

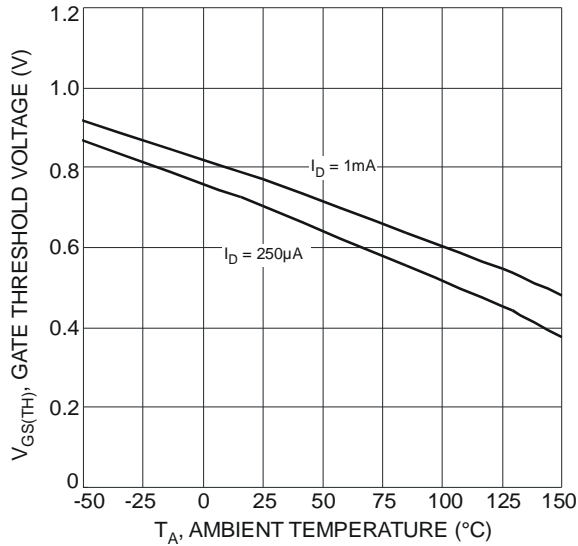


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

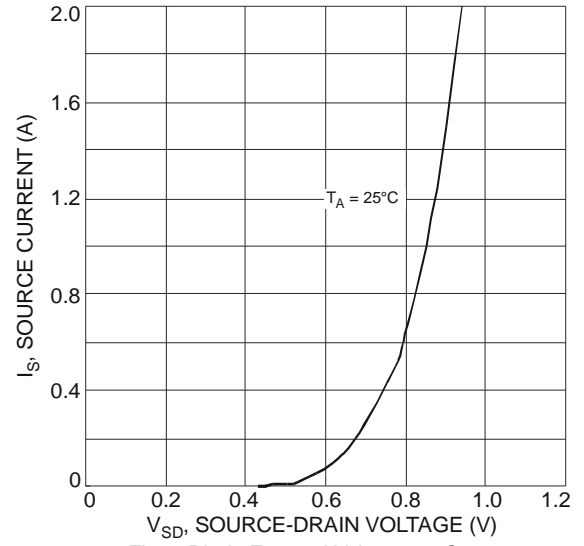


Fig. 8 Diode Forward Voltage vs. Current

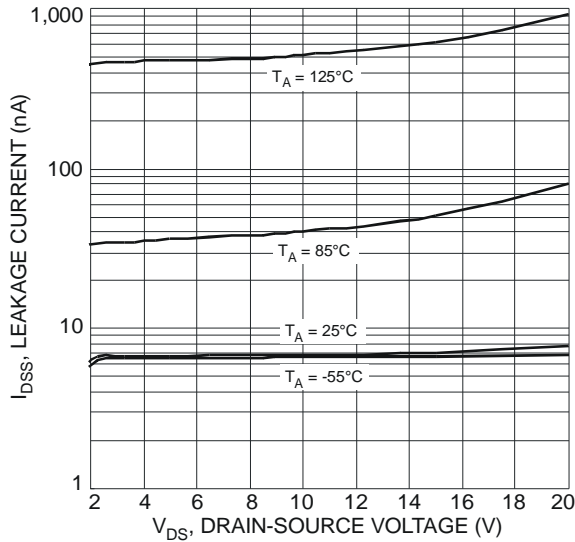


Fig. 9 Typical Leakage Current vs. Drain-Source Voltage

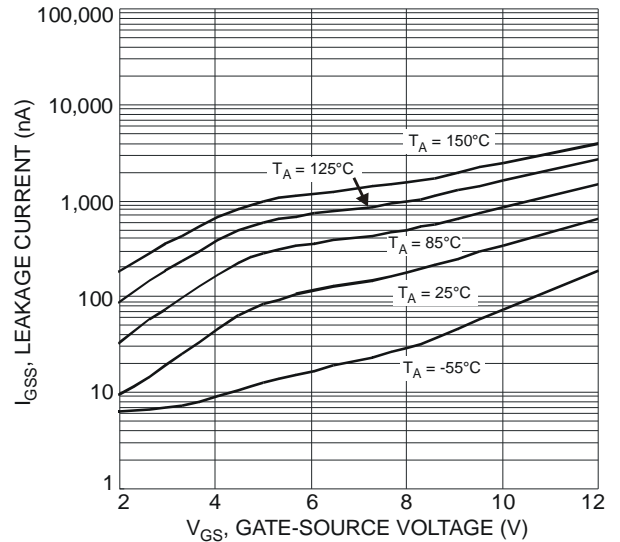


Fig.10 Leakage Current vs. Gate-Source Voltage

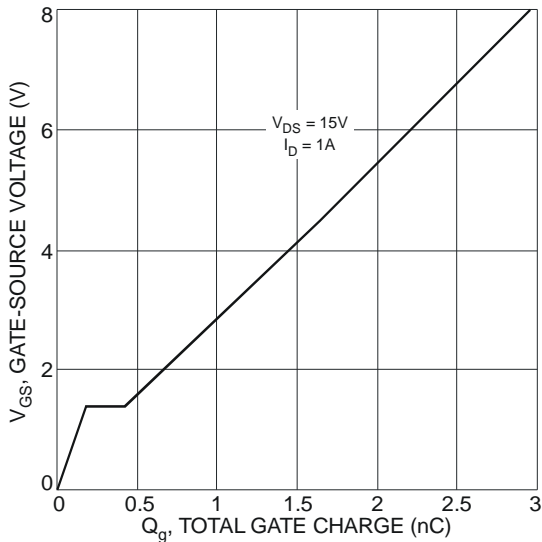


Fig. 11 Gate-Charge Characteristics

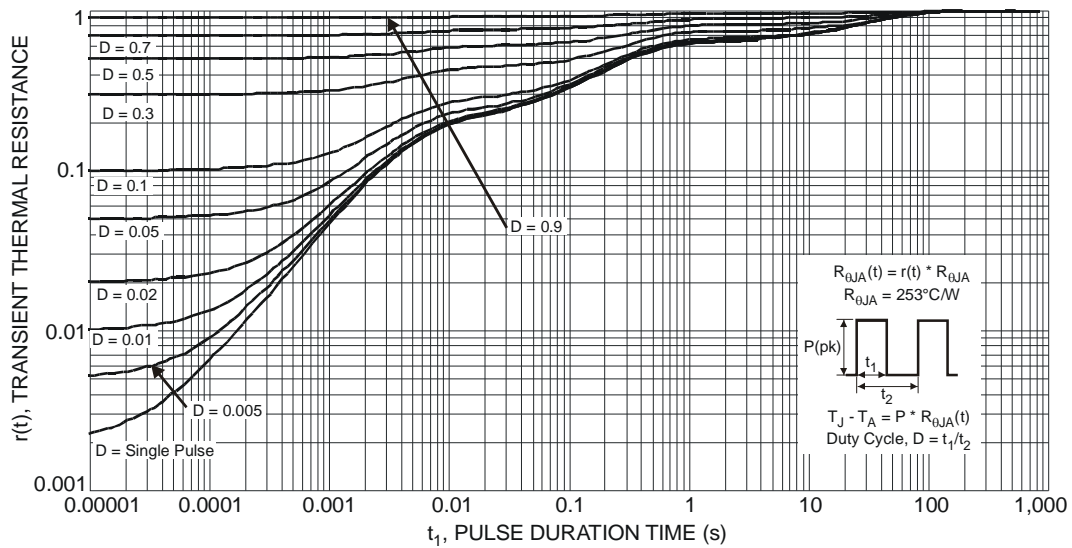
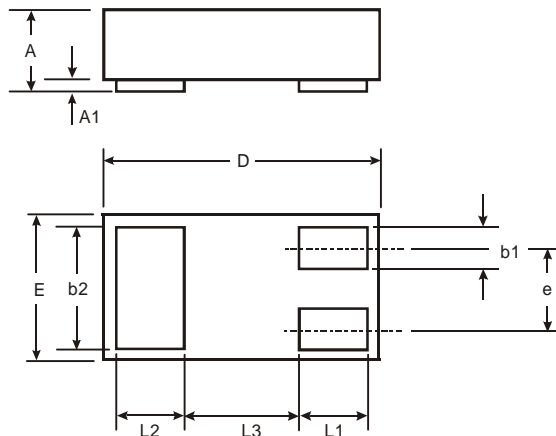


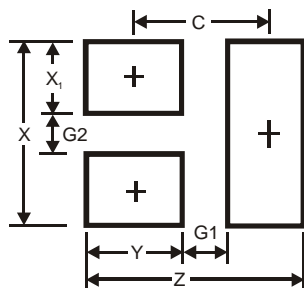
Fig. 12 Transient Thermal Response

**Package Outline Dimensions**



DFN1006H4-3			
Dim	Min	Max	Typ
A	—	0.40	—
A1	0	0.05	0.03
b1	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
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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