20V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D max T_A = +25°C
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
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **ESD Protected Gate 2KV**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description and Applications

This 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.

- Load Switch

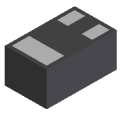
Mechanical Data

- Case: X1-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)

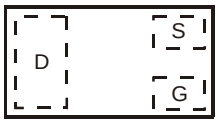


ESD PROTECTED TO 2kV

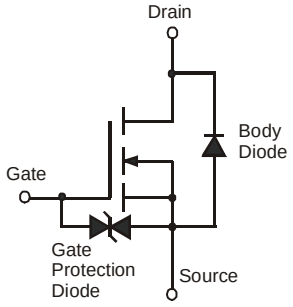
X1-DFN1006-3



Bottom View



Top View
Internal Schematic



Equivalent Circuit

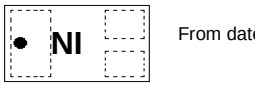
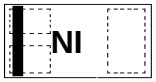
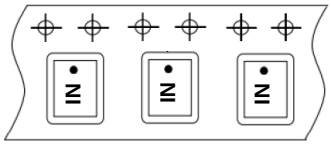
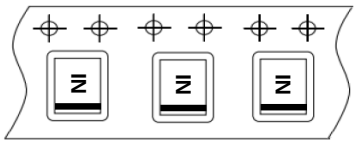
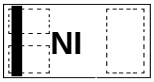
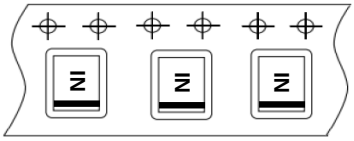
Ordering Information (Note 4)

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 purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html 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 http://www.diodes.com/products/packages.html.

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Marking Information

DMN2300UFB-7	 Top View Dot Denotes Drain Side From date code 1527 (YYWW), this changes to:  Top View Bar Denotes Gate and Source Side  
DMN2300UFB-7B	 Top View Bar Denotes Gate and Source Side NI = Part Marking Code 

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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 5) T_A = +85°C (Note 5) T_A = +25°C (Note 6)	I_D	1.32 0.94 1.78	A
Pulsed Drain Current (Note 7)			I_{DM}	8	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	0.468	W
Power Dissipation (Note 6)	P_D	1.2	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	267	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	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 8)						
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	µ A	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
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 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:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 25mm X 25mm square copper plate.
7. Device mounted on minimum recommended pad layout test board, 10µs pulse duty cycle = 1%.
8. Short duration pulse test used to minimize self-heating effect.

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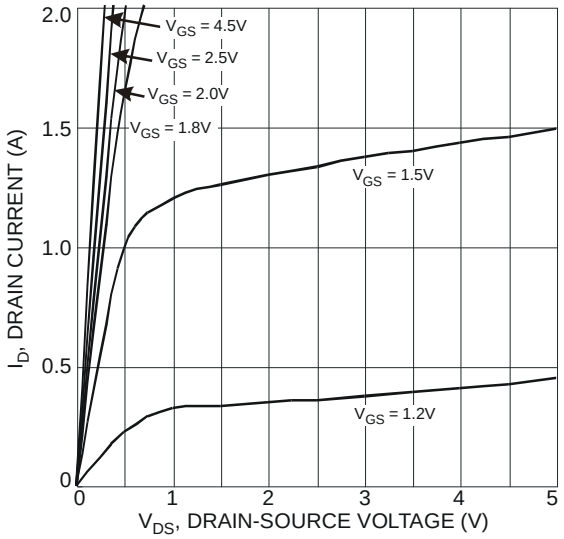


Fig. 1 Typical Output Characteristic

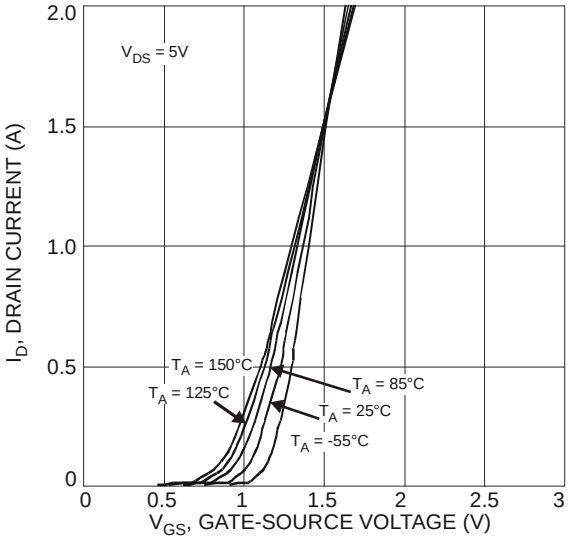


Fig. 2 Typical Transfer Characteristic

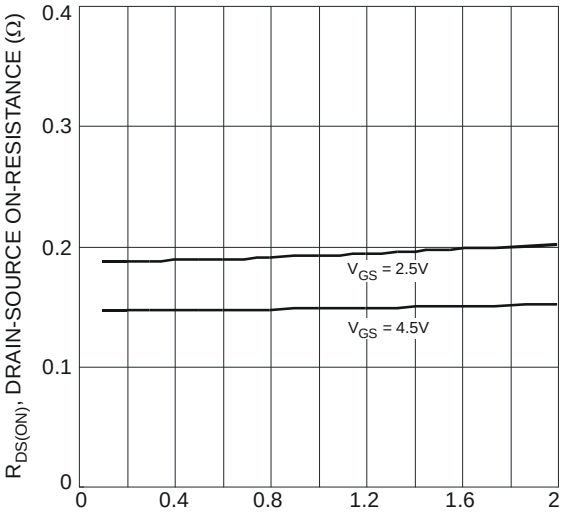


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

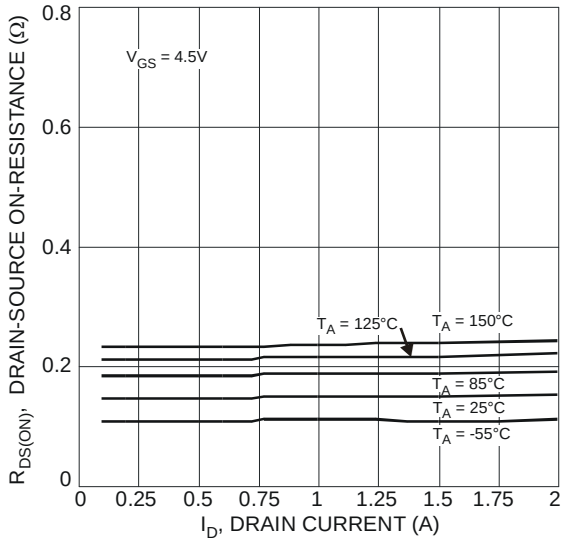


Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

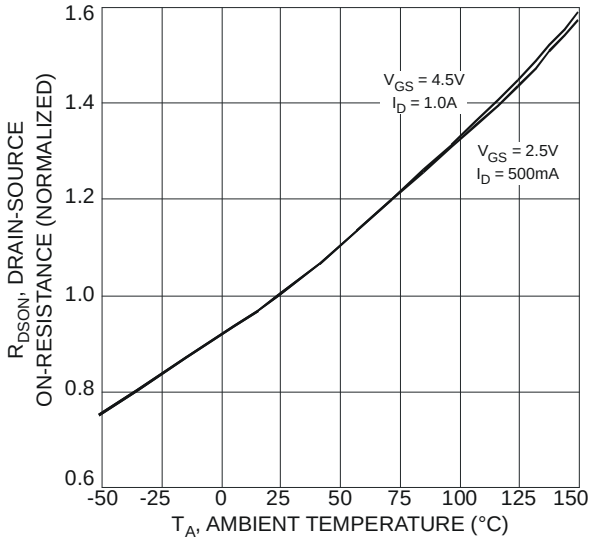


Fig. 5 On-Resistance Variation with Temperature

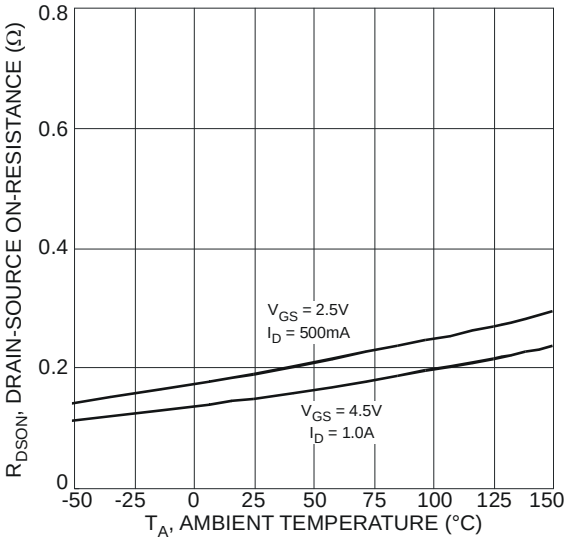


Fig. 6 On-Resistance Variation with Temperature

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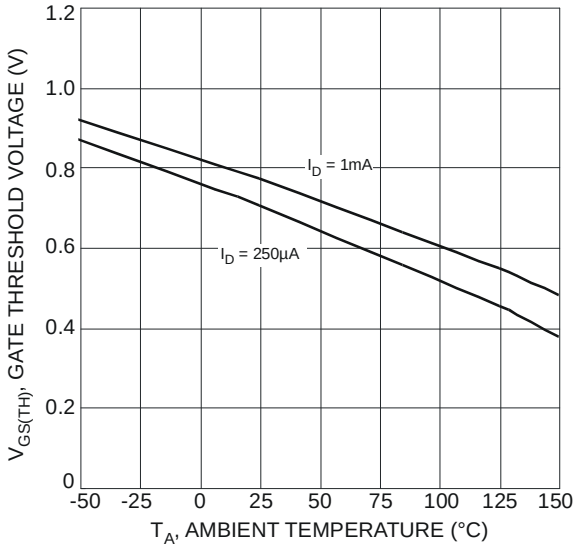


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

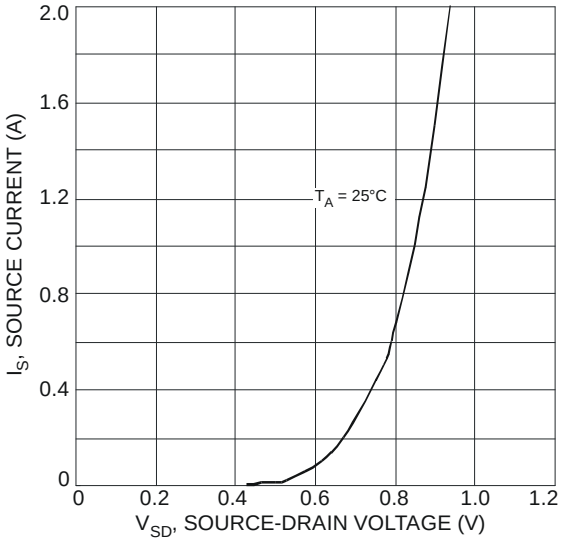


Fig. 8 Diode Forward Voltage vs. Current

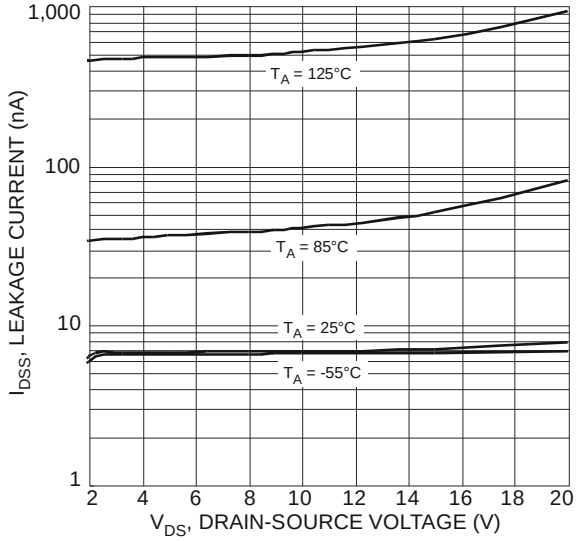


Fig. 9 Typical Leakage Current
vs. Drain-Source Voltage

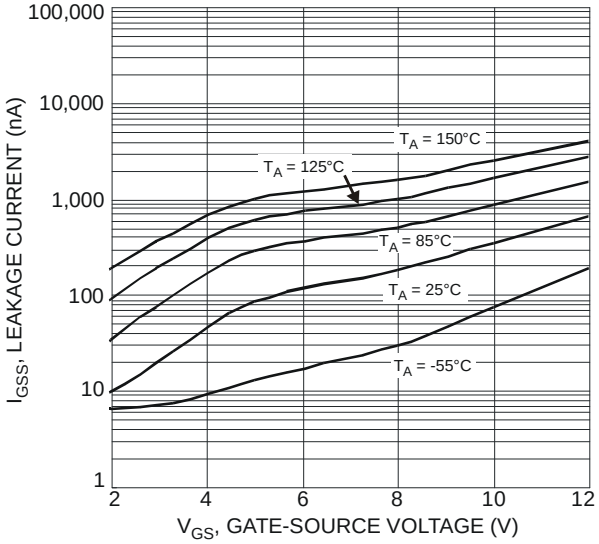


Fig.10 Leakage Current vs. Gate-Source Voltage

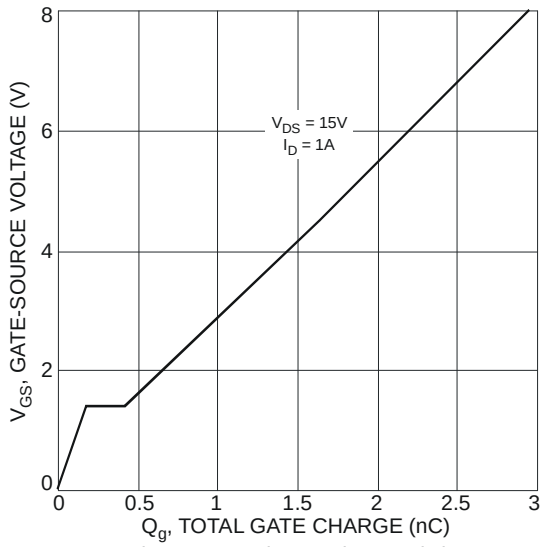


Fig. 11 Gate-Charge Characteristics

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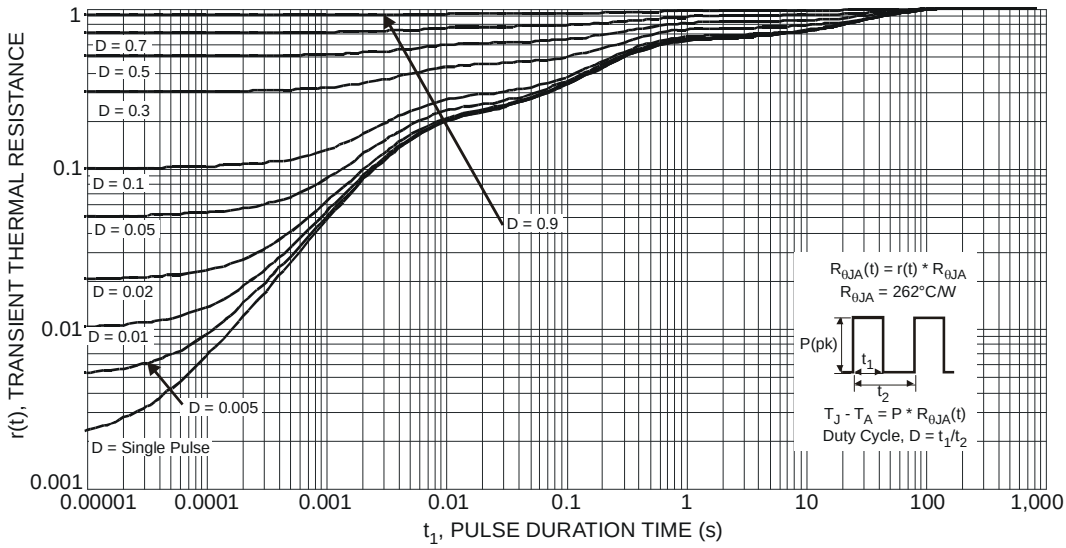
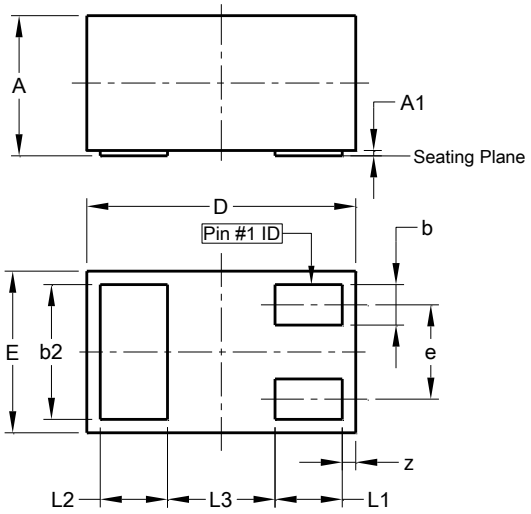


Fig. 12 Transient Thermal Response

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Package Outline Dimensions

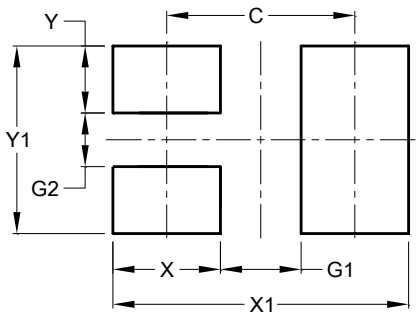
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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 AP02001 at http://www.diodes.com/datasheets/ap02001.pdf 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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