

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> T <sub>A</sub> = +25°C
20V	0.4Ω @ V <sub>GS</sub> = 4.5V	1A
	0.7Ω @ V <sub>GS</sub> = 1.8V	0.8A

## Features and Benefits

- Low On-Resistance
- Very Low Gate Threshold Voltage V<sub>GS(TH)</sub>, 1.0V Max.
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surfaced Mount Package
- Ultra-Low Package Profile, 0.4mm Maximum Package Height
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Description and Applications

This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

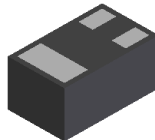
- DC-DC Converters
- Power Management Functions

## Mechanical Data

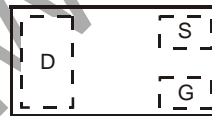
- Case: X2-DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu over Copper Leadframe; Solderable per MIL-STD-202, Method 208④
- Weight: 0.001 grams (Approximate)



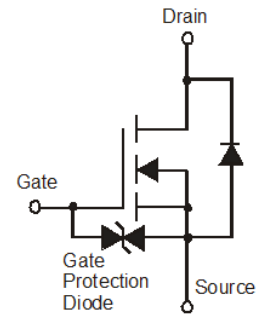
X2-DFN1006-3



Bottom View



Top View  
Internal Schematic





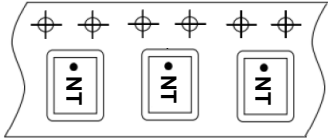
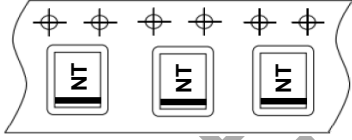

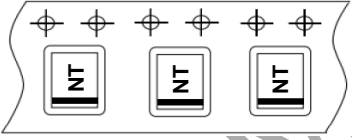
EQUIVALENT CIRCUIT

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2500UFB4-7	X2-DFN1006-3	3,000/Tape & Reel
DMN2500UFB4-7B	X2-DFN1006-3	10,000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  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/>.

**Marking Information**

<p><b>DMN2500UFB4-7</b></p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Top View Dot Denotes Drain Side</p> </div> <div style="text-align: center;"> <p>From date code 1527 (YYWW), this changes to:</p>  <p>Top View Bar Denotes Gate and Source Side</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;">   </div>
<p><b>DMN2500UFB4-7B</b></p>	<div style="text-align: center;">  <p>Top View Bar Denotes Gate and Source Side</p> </div> <div style="text-align: center; margin-top: 20px;">  <p>NT = Part Marking Code</p> </div>

NOT RECOMMENDED FOR NEW DESIGN

### Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±6	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	810 640	mA
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	950 750	mA
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	1000 800	mA
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	1200 1000	mA
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	4	A
Maximum Body Diode Continuous Current			I <sub>S</sub>	850	mA

### Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	0.46	W
	T <sub>A</sub> = +70°C		0.29	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	279	°C/W
	t < 10s		210	°C/W
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	0.95	W
	T <sub>A</sub> = +70°C		0.6	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	134	°C/W
	t < 10s		100	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	-	-	100	nA	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±1.0	µA	V <sub>GS</sub> = ±4.5V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.5	-	1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	-	0.3	0.4	Ω	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 600mA
			0.4	0.5		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 500mA
			0.5	0.7		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 350mA
Forward Transfer Admittance	Y <sub>fs</sub>	-	1.4	-	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 400mA
Diode Forward Voltage	V <sub>SD</sub>	-	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 150mA
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	-	60.67	-	pF	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	9.68	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	5.37	-	pF	
Gate Resistance	R <sub>g</sub>	-	93	-	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge	Q <sub>g</sub>	-	736.6	-	pC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V, I <sub>D</sub> = 250mA
Gate-Source Charge	Q <sub>gs</sub>	-	93.6	-	pC	
Gate-Drain Charge	Q <sub>gd</sub>	-	116.6	-	pC	
Turn-On Delay Time	t <sub>D(ON)</sub>	-	5.1	-	ns	V <sub>DD</sub> = 10V, V <sub>GS</sub> = 4.5V, R <sub>L</sub> = 47Ω, R <sub>G</sub> = 10Ω, I <sub>D</sub> = 200mA
Turn-On Rise Time	t <sub>R</sub>	-	7.4	-	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	-	26.7	-	ns	
Turn-Off Fall Time	t <sub>F</sub>	-	12.3	-	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 1-inch square copper plate.
  7. Short duration pulse test used to minimize self-heating effect.
  8. Guaranteed by design. Not subject to product testing.

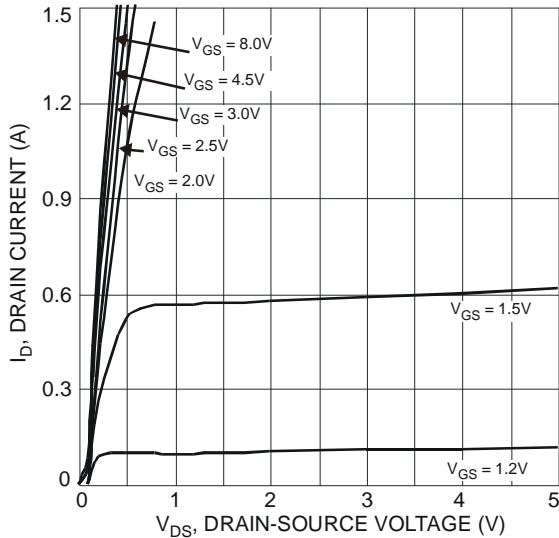


Fig. 1 Typical Output Characteristics

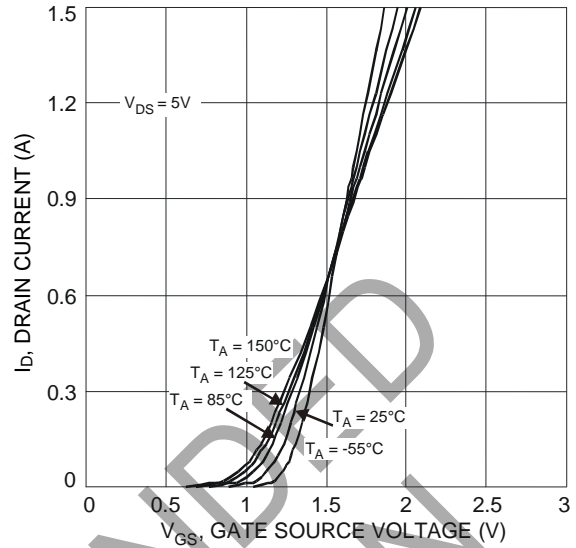


Fig. 2 Typical Transfer Characteristics

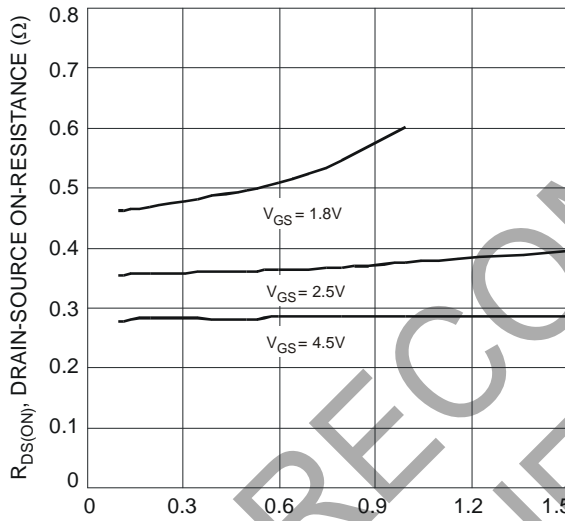


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

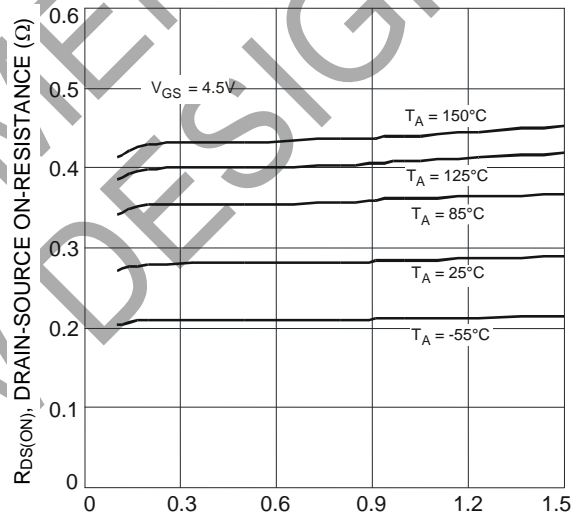


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

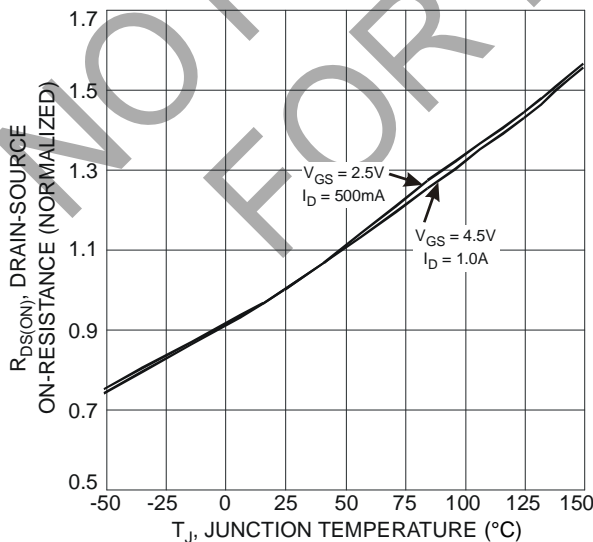


Fig. 5 On-Resistance Variation with Temperature

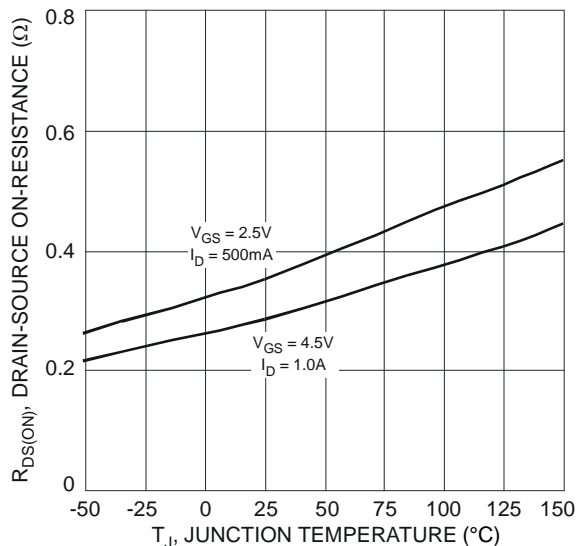


Fig. 6 On-Resistance Variation with Temperature

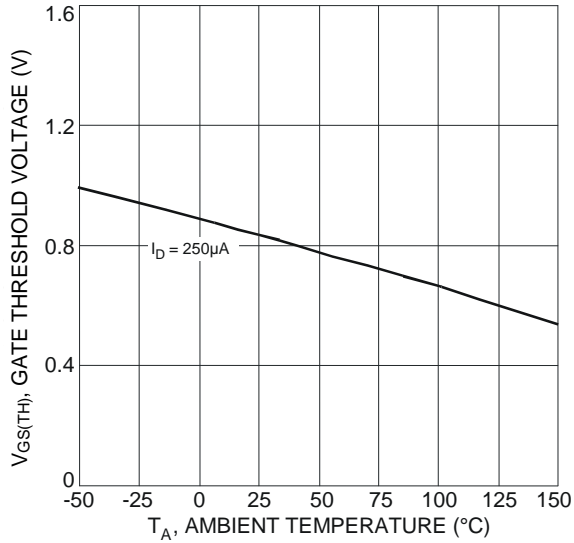


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

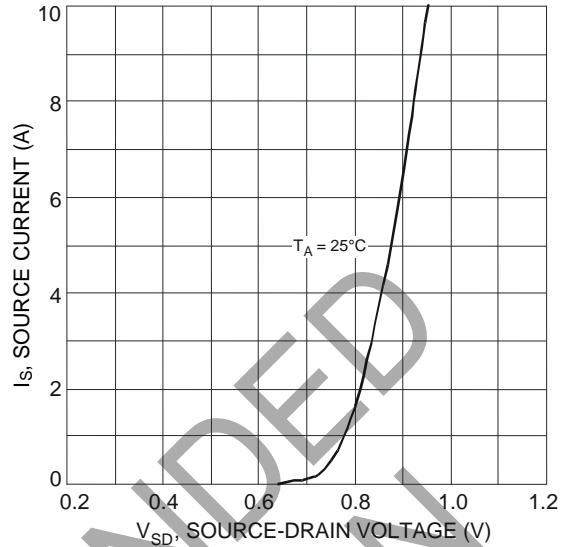


Fig. 8 Diode Forward Voltage vs. Current

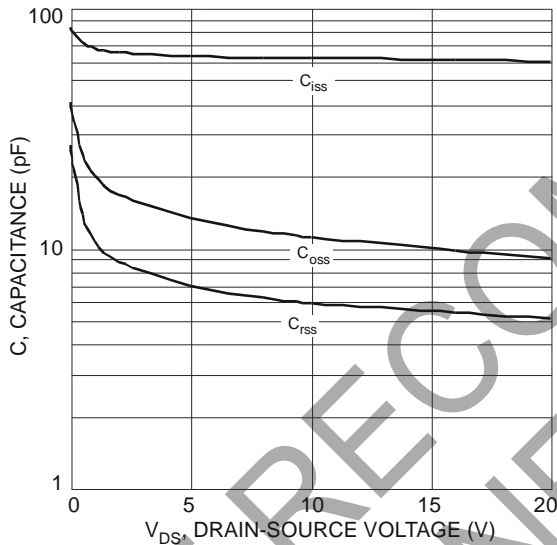


Fig. 9 Typical Capacitance

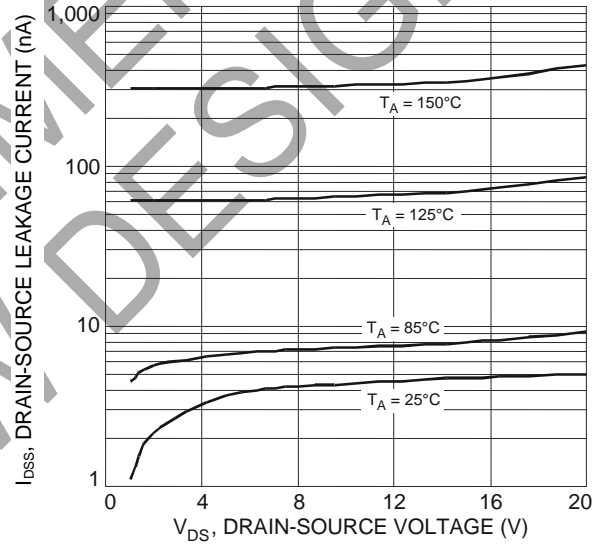
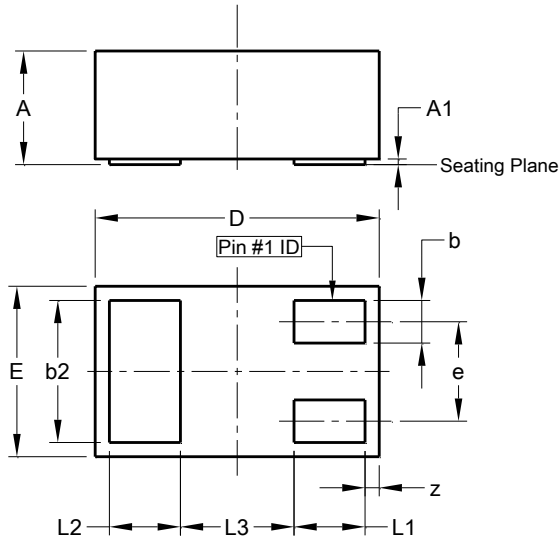


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

**Package Outline Dimensions**

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

**X2-DFN1006-3**

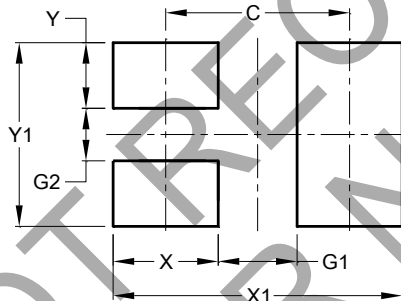


X2-DFN1006-3			
Dim	Min	Max	Typ
A	—	0.40	—
A1	0.00	0.05	0.03
b	0.10	0.20	0.15
b2	0.45	0.55	0.50
D	0.95	1.05	1.00
E	0.55	0.65	0.60
e	-	-	0.35
L1	0.20	0.30	0.25
L2	0.20	0.30	0.25
L3	-	-	0.40
z	0.02	0.08	0.05
All Dimensions in mm			

**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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