

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ max	$I_D$ $T_A = 25^\circ C$
20V	0.4Ω @ $V_{GS} = 4.5V$	1A
	0.7Ω @ $V_{GS} = 1.8V$	0.8A

## Description and Applications

This new generation 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.

- DC-DC Converters
- Power management functions

## Features and Benefits

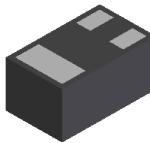
- Low On-Resistance
- Very Low Gate Threshold Voltage  $V_{GS(TH)}$ , 1.0V max
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surfaced Mount Package
- Ultra-low package profile, 0.4mm maximum package height
- ESD Protected Gate**
- Lead, Halogen, and Antimony Free, RoHS Compliant (Note 1)
- "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

## Mechanical Data

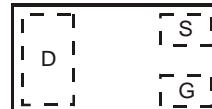
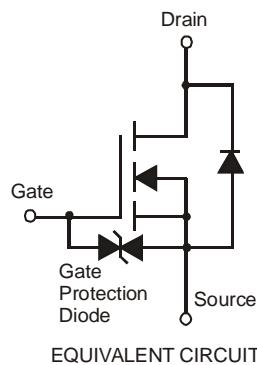
- Case: X2-DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.001 grams (approximate)



X2-DFN1006-3



Bottom View


 Top View  
 Internal Schematic


## Ordering Information (Note 3)

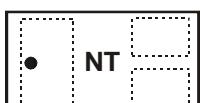
Part Number	Case	Packaging
DMN2500UFB4-7	X2-DFN1006-3	3,000/Tape & Reel
DMN2500UFB4-7B	X2-DFN1006-3	10,000/Tape & Reel

Notes:

- EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. No purposely added lead. Halogen and Antimony free
- Diodes Inc.'s "Green" policy can be found on our website at <http://www.diodes.com>.
- For packaging details, go to our website at <http://www.diodes.com>.

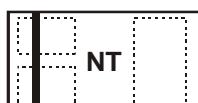
## Marking Information

DMN2500UFB4-7



Top View  
 Dot Denotes  
 Drain Side

DMN2500UFB4-7B



Top View  
 Bar Denotes Gate  
 and Source Side

NT = Product Type Marking Code

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DSS}$	20	V
Gate-Source Voltage			$V_{GSS}$	$\pm 6$	V
Continuous Drain Current (Note 4) $V_{GS} = 4.5\text{V}$	Steady State	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	$I_D$	810 640	mA
	$t < 10\text{s}$	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	$I_D$	950 750	mA
Continuous Drain Current (Note 5) $V_{GS} = 4.5\text{V}$	Steady State	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	$I_D$	1000 800	mA
	$t < 10\text{s}$	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	$I_D$	1200 1000	mA
Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%)			$I_{DM}$	4	A
Maximum Body Diode continuous Current			$I_S$	850	mA

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

Characteristic			Symbol	Value	Units
Total Power Dissipation (Note 4)	$T_A = 25^\circ\text{C}$		$P_D$	0.46	W
	$T_A = 70^\circ\text{C}$			0.29	
Thermal Resistance, Junction to Ambient (Note 4)	Steady state	$R_{\theta JA}$	279	$^\circ\text{C/W}$	
	$t < 10\text{s}$		210		
Total Power Dissipation (Note 5)	$T_A = 25^\circ\text{C}$	$P_D$	0.95	W	
	$T_A = 70^\circ\text{C}$		0.6		
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	134	$^\circ\text{C/W}$	
	$t < 10\text{s}$		100		
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150		°C

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

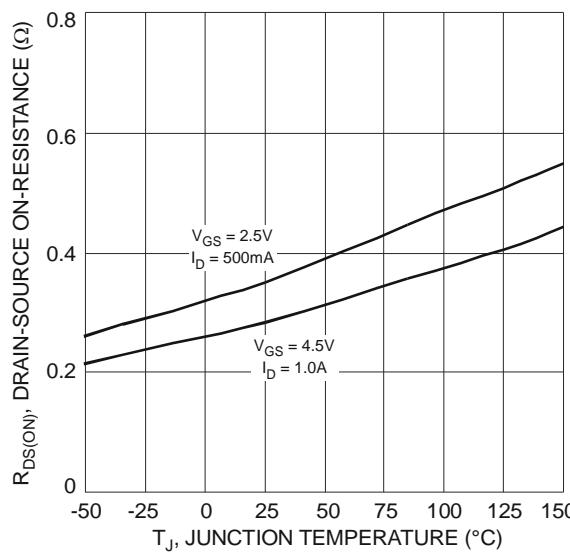
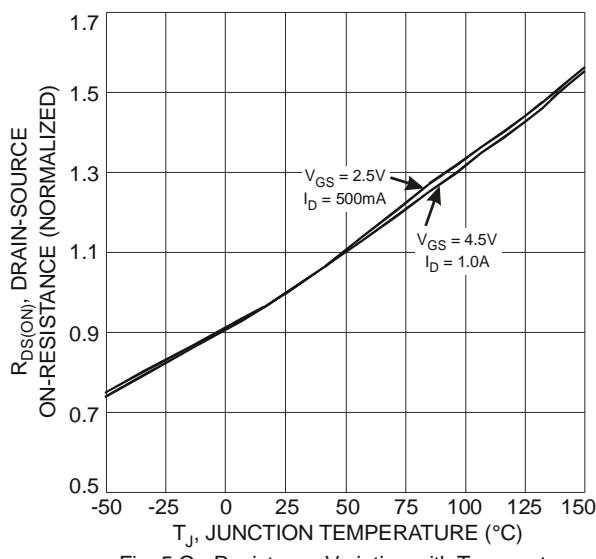
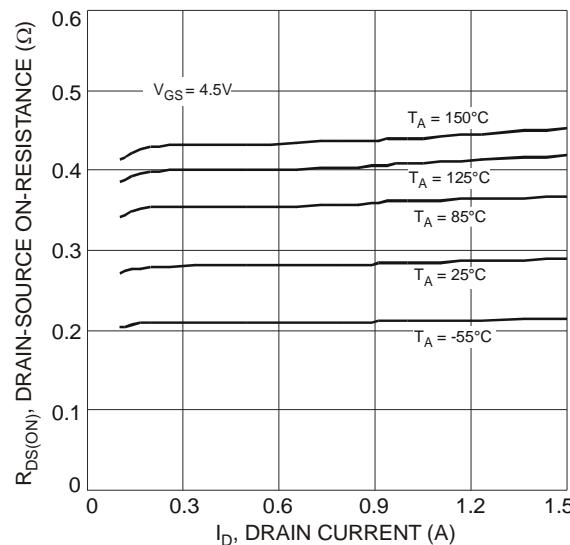
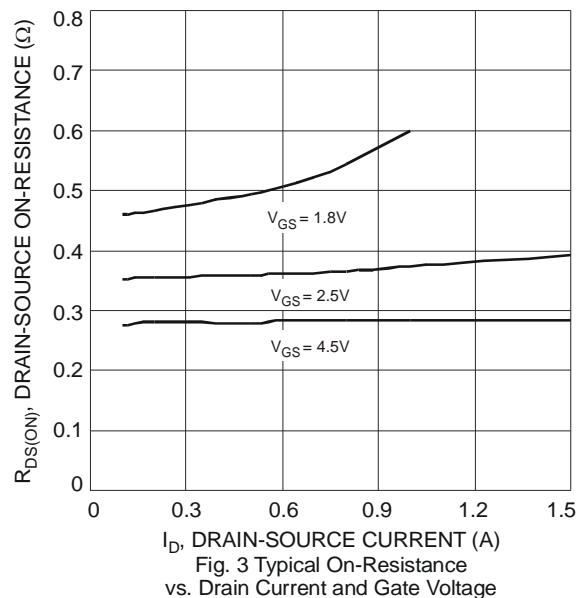
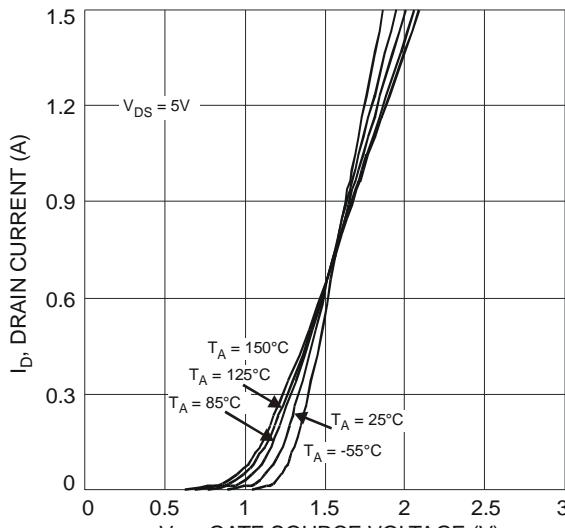
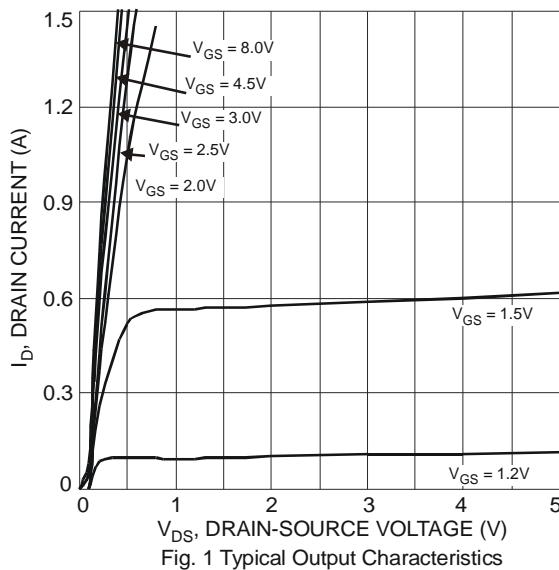
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	20	-	-	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = 25^\circ\text{C}$	$I_{DSS}$	-	-	100	nA	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GS}$	-	-	$\pm 1.0$	$\mu\text{A}$	$V_{GS} = \pm 4.5\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	0.5	-	1.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(\text{ON})}$	-	0.3	0.4	$\Omega$	$V_{GS} = 4.5\text{V}, I_D = 600\text{mA}$
			0.4	0.5		$V_{GS} = 2.5\text{V}, I_D = 500\text{mA}$
			0.5	0.7		$V_{GS} = 1.8\text{V}, I_D = 350\text{mA}$
Forward Transfer Admittance	$ Y_{fs} $	-	1.4	-	S	$V_{DS} = 10\text{V}, I_D = 400\text{mA}$
Diode Forward Voltage	$V_{SD}$		0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 150\text{mA}$
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	$C_{iss}$	-	60.67	-	pF	$V_{DS} = 16\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	-	9.68	-	pF	
Reverse Transfer Capacitance	$C_{rss}$	-	5.37	-	pF	
Gate resistance	$R_g$	-	93	-	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge	$Q_g$	-	736.6	-	pC	$V_{GS} = 4.5\text{V}, V_{DS} = 10\text{V}, I_D = 250\text{mA}$
Gate-Source Charge	$Q_{qs}$	-	93.6	-	pC	
Gate-Drain Charge	$Q_{gd}$	-	116.6	-	pC	
Turn-On Delay Time	$t_{D(on)}$	-	5.1	-	ns	$V_{DD} = 10\text{V}, V_{GS} = 4.5\text{V}, R_L = 47\Omega, R_G = 10\Omega, I_D = 200\text{mA}$
Turn-On Rise Time	$t_r$	-	7.4	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	26.7	-	ns	
Turn-Off Fall Time	$t_f$	-	12.3	-	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 1inch square copper plate.

6. Short duration pulse test used to minimize self-heating effect.

7. Guaranteed by design. Not subject to product testing.



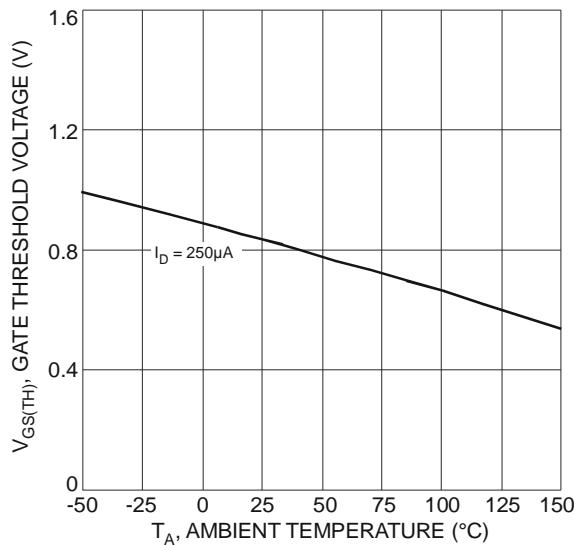


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

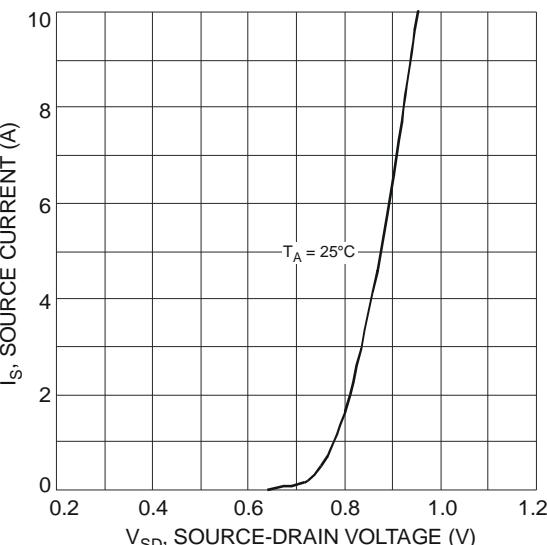


Fig. 8 Diode Forward Voltage vs. Current

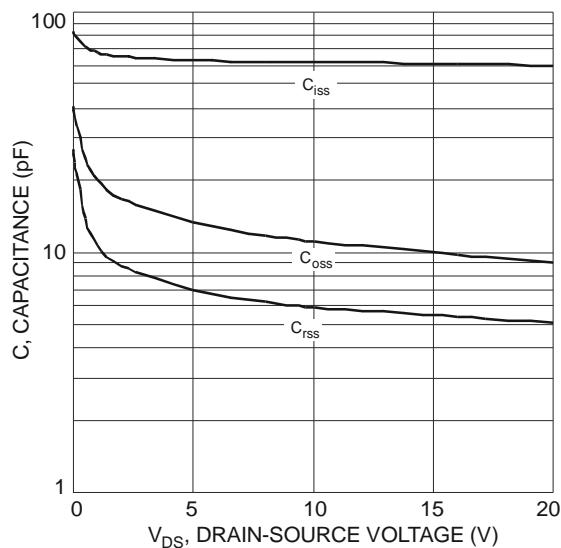


Fig. 9 Typical Capacitance

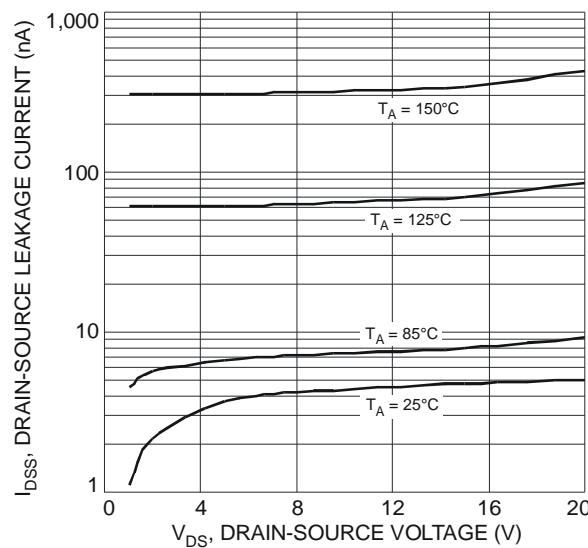
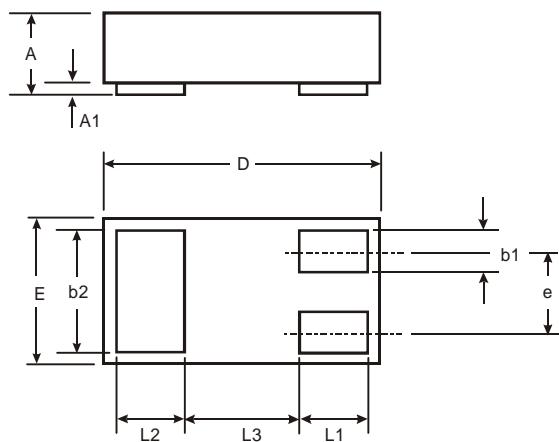


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

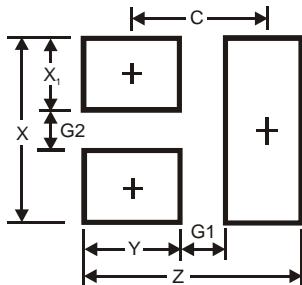
## Package Outline Dimensions



X2-DFN1006-3			
Dim	Min	Max	Typ
A	—	0.40	—
A1	0	0.05	0.02
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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