

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = 25^\circ\text{C}$
20V	$0.55\Omega$ @ $V_{GS} = 4.5\text{V}$	0.75A
	$0.75\Omega$ @ $V_{GS} = 2.5\text{V}$	0.63A

## 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.

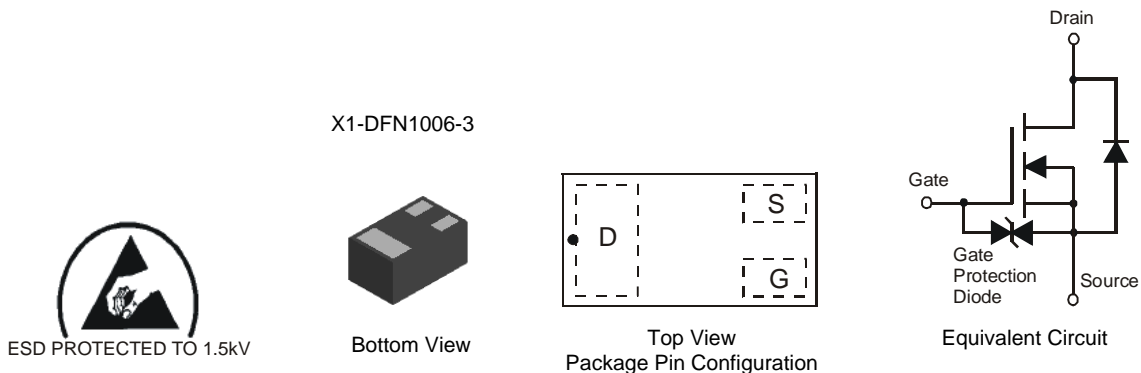
- Battery Charging
- Power Management Functions
- DC-DC Converters
- Portable Power Adaptors

## Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package
- **ESD Protected up to 1.5kV**
- **Lead-Free Finish; RoHS compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 standards for High Reliability**

## 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
- Terminal Connections Indicator: Collector Dot
- Terminals: Finish — NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.001 grams (approximate)

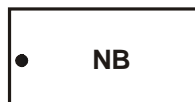


## Ordering Information (Note 3)

Part Number	Case	Packaging
DMN2400UFB-7	X1-DFN1006-3	3,000/Tape & Reel
DMN2400UFB-7B	X1-DFN1006-3	10,000/Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. No purposely added lead. Halogen and Antimony free
  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



NB = Product Type Marking Code  
Dot Denotes Drain Side

**Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±12	V
Continuous Drain Current (Note 4) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = 25°C	I <sub>D</sub>	0.75	A
		T <sub>A</sub> = 85°C		0.55	
Continuous Drain Current (Note 4) V <sub>GS</sub> = 2.5V	Steady State	T <sub>A</sub> = 25°C	I <sub>D</sub>	0.63	A
		T <sub>A</sub> = 85°C		0.45	
Pulsed Drain Current (Note 5)			I <sub>DM</sub>	3	A

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 4)	P <sub>D</sub>	0.47	mW
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	258	°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 6)</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
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±50	μA	V <sub>GS</sub> = ±10V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.5	-	0.9	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	-	0.55	Ω	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 600mA
		-	-	0.75		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 500mA
		-	-	0.9		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 350mA
		-	-	-		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 350mA
Forward Transfer Admittance	Y <sub>fs</sub>	-	1.0	-	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 400mA
Diode Forward Voltage (Note 6)	V <sub>SD</sub>	-	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 150mA
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iss</sub>	-	36.0	-	pF	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	5.7	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	4.2	-	pF	
Total Gate Charge	Q <sub>g</sub>	-	0.5	-	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V, I <sub>D</sub> = 250mA
Gate-Source Charge	Q <sub>gs</sub>	-	0.07	-	nC	
Gate-Drain Charge	Q <sub>gd</sub>	-	0.1	-	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	-	4.11	-	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>	-	3.82	-	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	14.8	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	9.6	-	ns	

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
  - Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

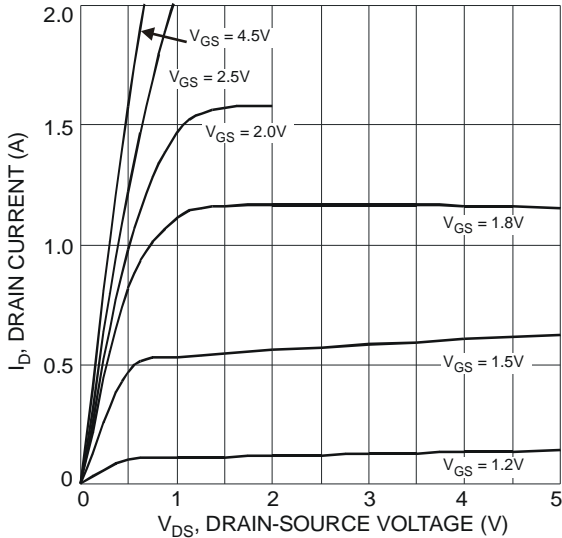


Fig. 1 Typical Output Characteristics

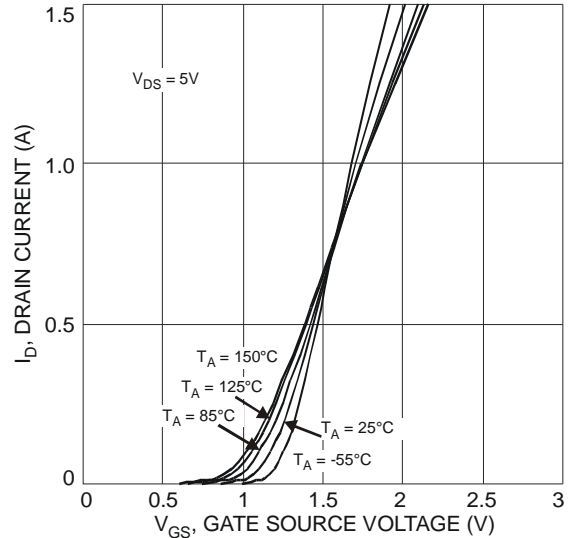


Fig. 2 Typical Transfer Characteristics

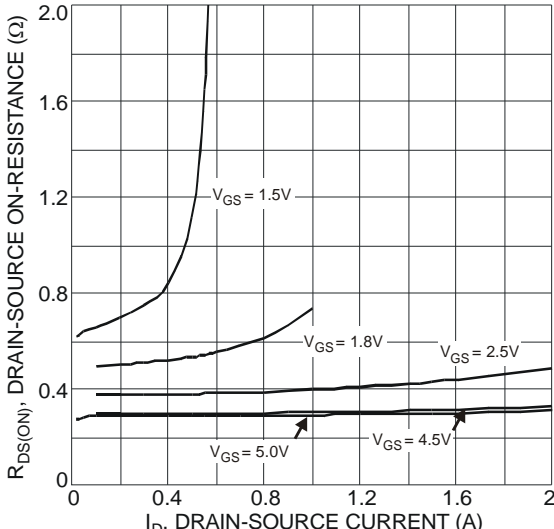


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

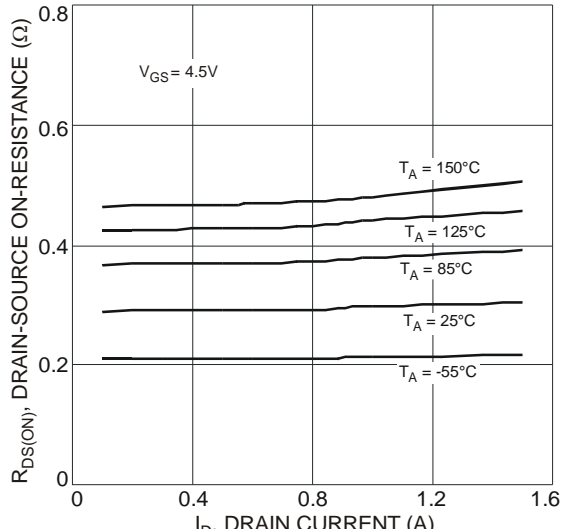


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

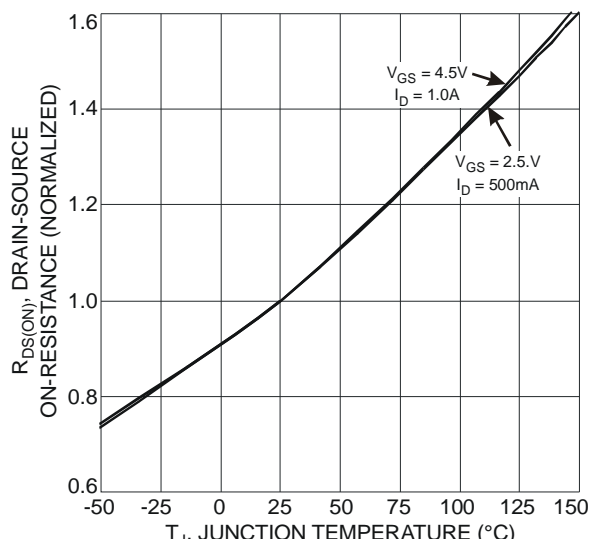


Fig. 5 On-Resistance Variation with Temperature

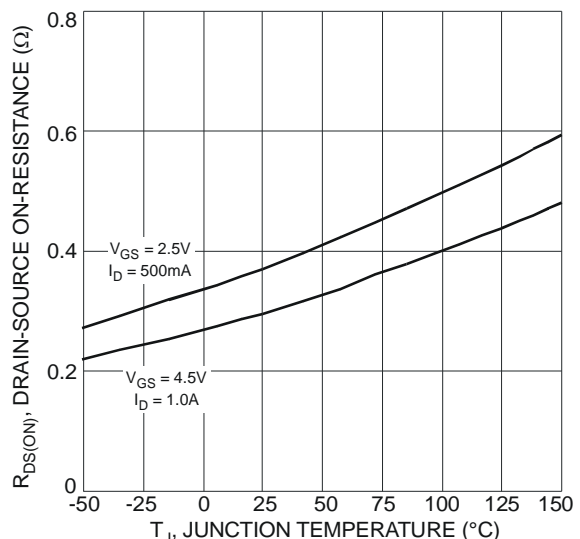


Fig. 6 On-Resistance Variation with Temperature

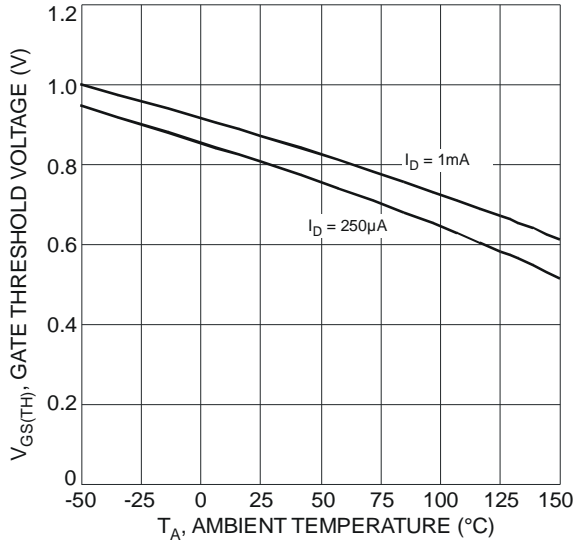


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

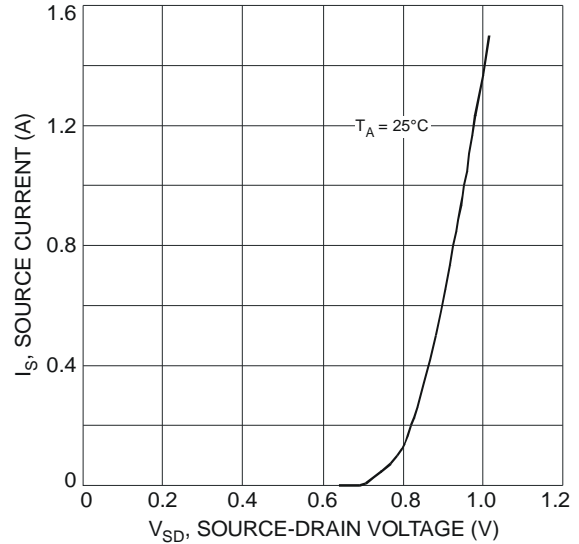


Fig. 8 Diode Forward Voltage vs. Current

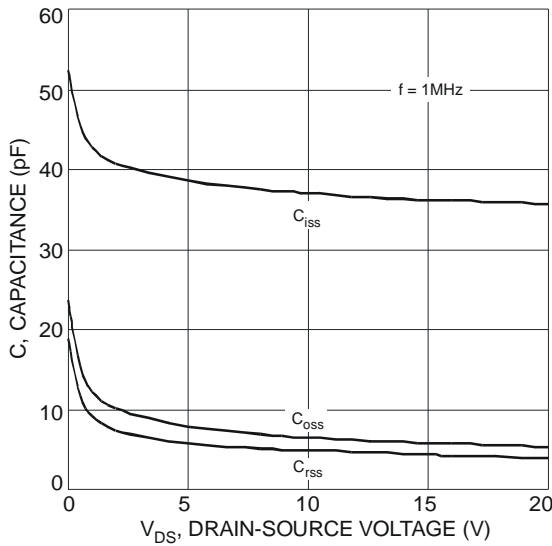


Fig. 9 Typical Capacitance

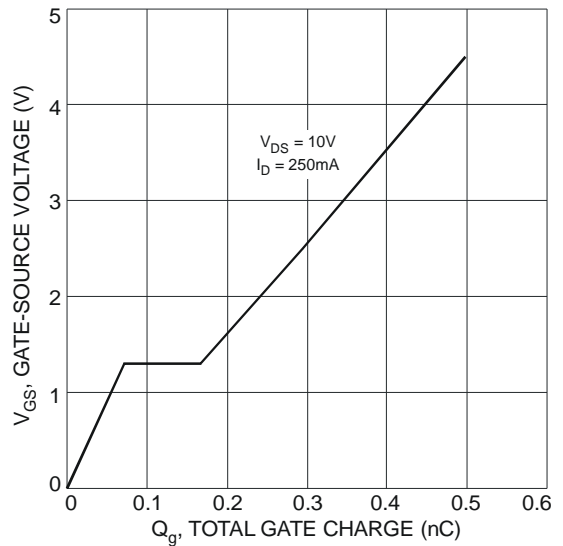


Fig. 10 Gate-Charge Characteristics

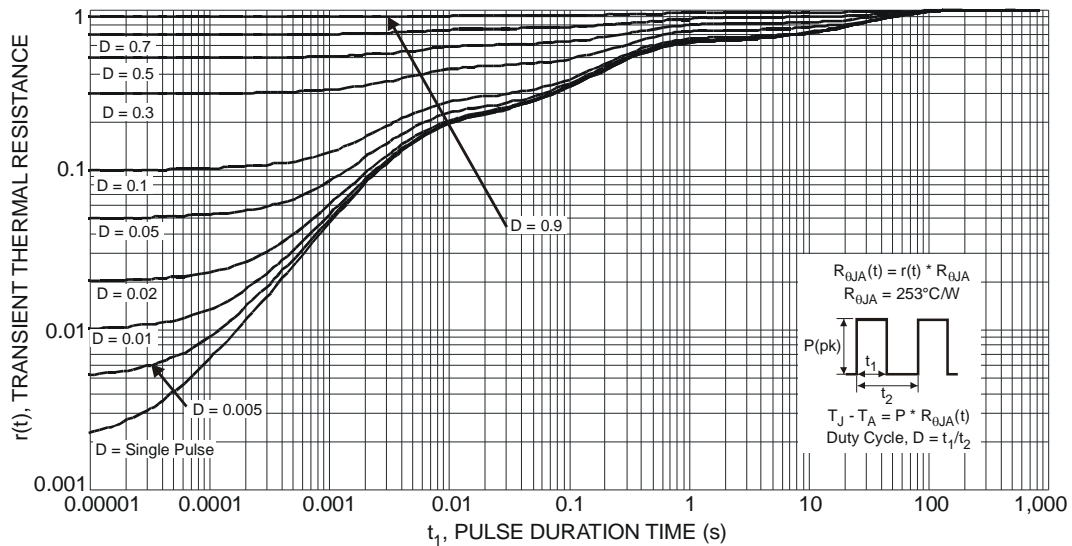
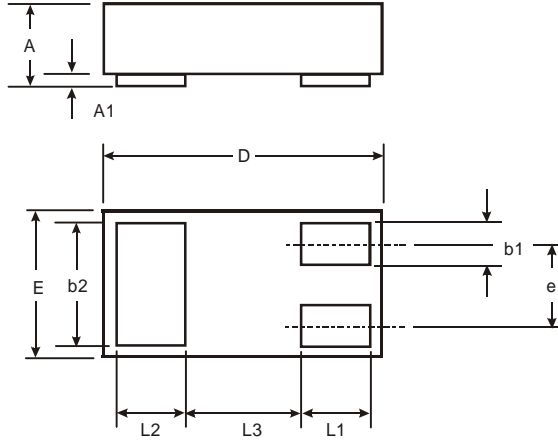


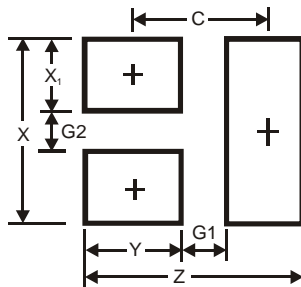
Fig. 11 Transient Thermal Response

**Package Outline Dimensions**



X1-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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