

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ $T_A = +25^\circ C$
30V	760m $\Omega$ @ $V_{GS} = 4.5V$	0.65A
	930m $\Omega$ @ $V_{GS} = 2.5V$	0.58A
	1500m $\Omega$ @ $V_{GS} = 1.8V$	0.45A

## Description

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.

## Applications

- Load switch
- Portable applications
- Power Management Functions

## Features

- 0.4mm ultra low profile package for thin application
- 0.48mm<sup>2</sup> package footprint, 16 times smaller than SOT23
- Low  $V_{GS(th)}$ , can be driven directly from a battery
- Low  $R_{DS(on)}$
- **ESD Protected**
- **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**

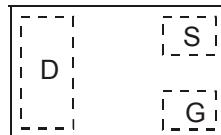
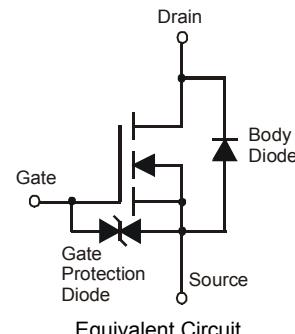
## Mechanical Data

- Case: X2-DFN0806-3
- 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: 0.00043 grams (approximate)

X2-DFN0806-3



Bottom View

Top View  
Package Pin Configuration

Equivalent Circuit

## Ordering Information (Note 4)

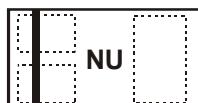
Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN3900UFA-7B	NU	7	8	10,000

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](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>.

## Marking Information

DMN3900UFA-7B



NU = Product Type Marking Code

Top View  
Bar Denotes Gate  
and Source Side

**Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		$V_{DSS}$	30	V
Gate-Source Voltage		$V_{GSS}$	$\pm 8$	
Continuous Drain Current	$V_{GS} = 4.5\text{V}$	$I_D$	0.65	A
			0.52	
		$I_D$	0.55	
Pulsed Drain Current		$I_{DM}$	2.5	

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

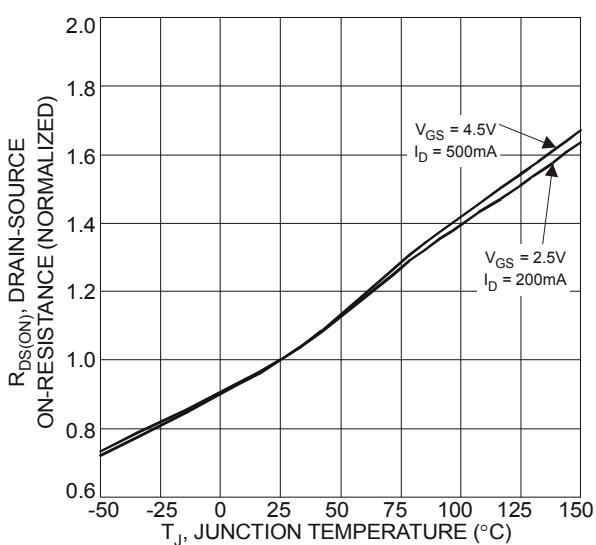
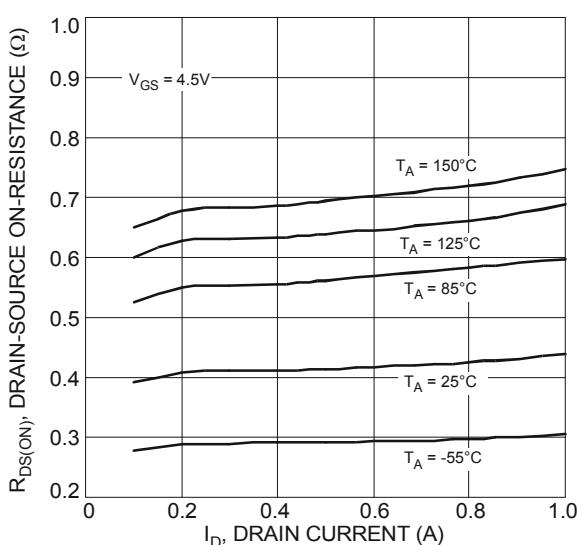
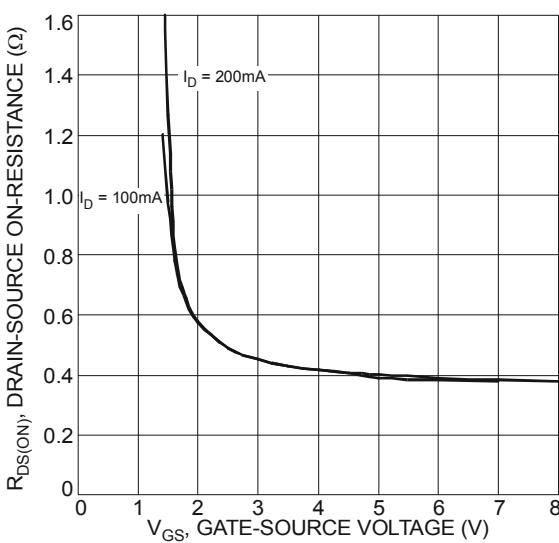
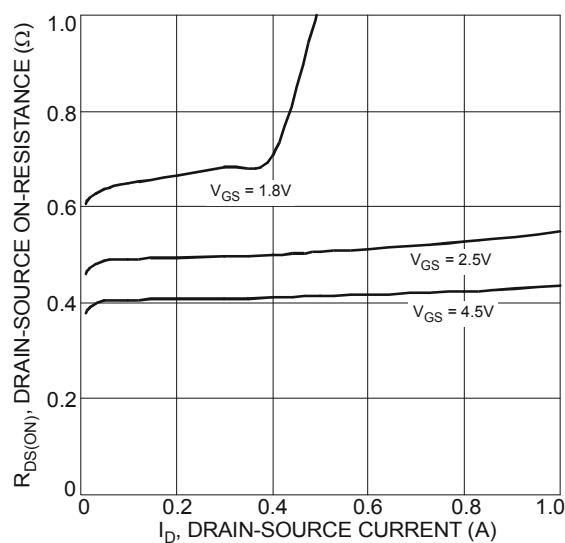
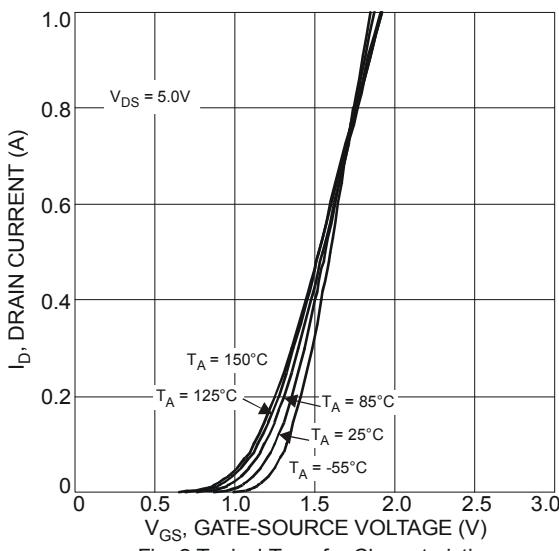
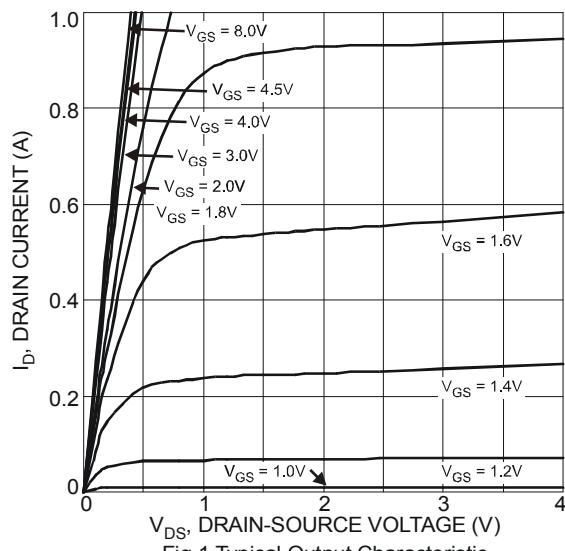
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	$P_D$	490	mW
	(Note 5)		390	
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	255	°C/W
	(Note 5)		327	
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	°C

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 8)						
Drain-Source Breakdown Voltage	$BV_{DSS}$	30	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	3	$\mu\text{A}$	$V_{GS} = \pm 8\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS</b> (Note 8)						
Gate Threshold Voltage	$V_{GS(\text{th})}$	0.45	—	0.95	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(\text{on})}$	—	400	760	$\text{m}\Omega$	$V_{GS} = 4.5\text{V}, I_D = 200\text{mA}$
			480	930		$V_{GS} = 2.5\text{V}, I_D = 100\text{mA}$
			617	1500		$V_{GS} = 1.8\text{V}, I_D = 75\text{mA}$
Forward Transfer Admittance	$ Y_{fs} $	40	—	—	$\text{mS}$	$V_{DS} = 3\text{V}, I_D = 10\text{mA}$
Diode Forward Voltage (Note 8)	$V_{SD}$	—	0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 300\text{mA}$
<b>DYNAMIC CHARACTERISTICS</b> (Note 9)						
Input Capacitance	$C_{iss}$	—	42.2	—	$\text{pF}$	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	4.5	—	$\text{pF}$	
Reverse Transfer Capacitance	$C_{rss}$	—	3.4	—	$\text{pF}$	
Gate Resistance	$R_g$	—	468	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge	$Q_g$	—	0.7	—	$\text{nC}$	$V_{GS} = 4.5\text{V}, V_{DS} = 15\text{V}, I_D = 200\text{mA}$
Gate-Source Charge	$Q_{gs}$	—	0.11	—	$\text{nC}$	
Gate-Drain Charge	$Q_{gd}$	—	0.15	—	$\text{nC}$	
Turn-On Delay Time	$t_{D(\text{on})}$	—	10.5	—	$\text{ns}$	$V_{DS} = 10\text{V}, I_D = 200\text{mA}$ $V_{GS} = 4.5\text{V}, R_G = 6\Omega$
Turn-On Rise Time	$t_r$	—	7.8	—	$\text{ns}$	
Turn-Off Delay Time	$t_{D(\text{off})}$	—	80.6	—	$\text{ns}$	
Turn-Off Fall Time	$t_f$	—	23.4	—	$\text{ns}$	

Notes:

5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
6. Device mounted on FR-4 PCB, with minimum recommended pad layout, except the device measured at  $t \leq 10 \text{ sec}$ .
7. Device mounted on minimum recommended pad layout test board,  $10\mu\text{s}$  pulse duty cycle = 1%.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to production testing.



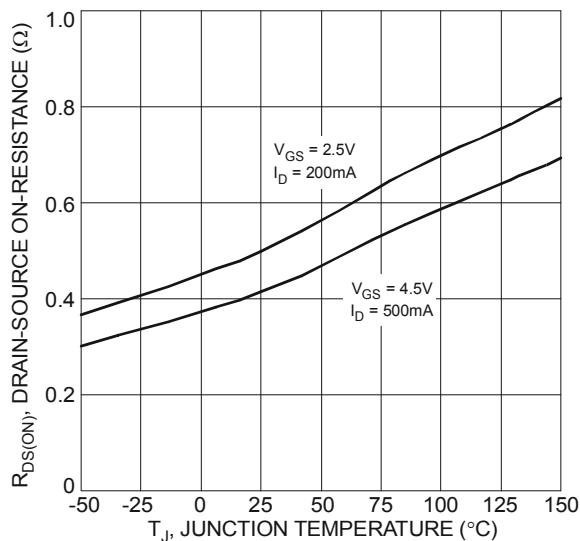


Fig. 7 On-Resistance Variation with Temperature

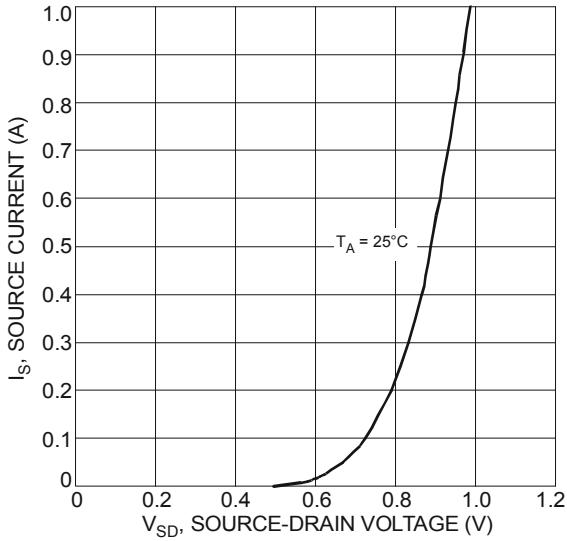


Fig. 9 Diode Forward Voltage vs. Current

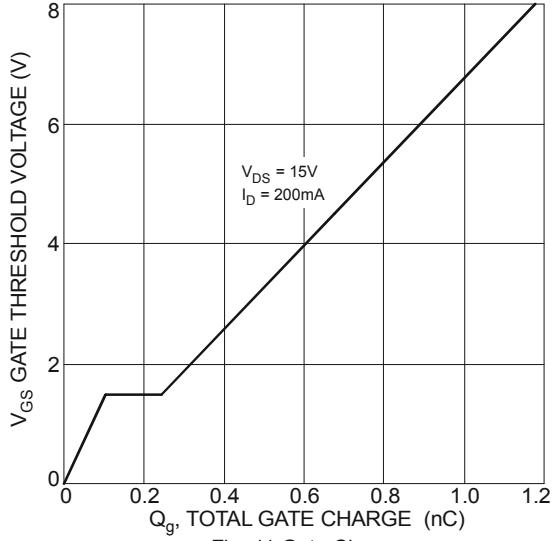


Fig. 11 Gate Charge

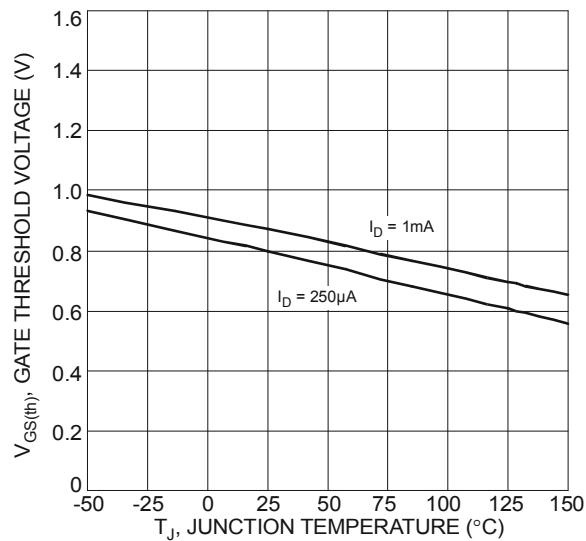


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

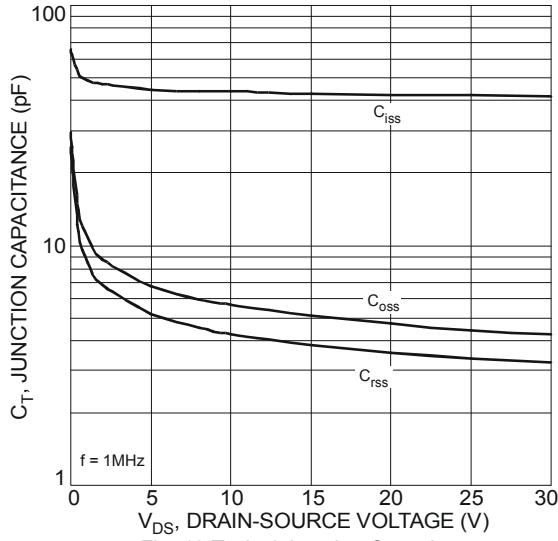


Fig. 10 Typical Junction Capacitance

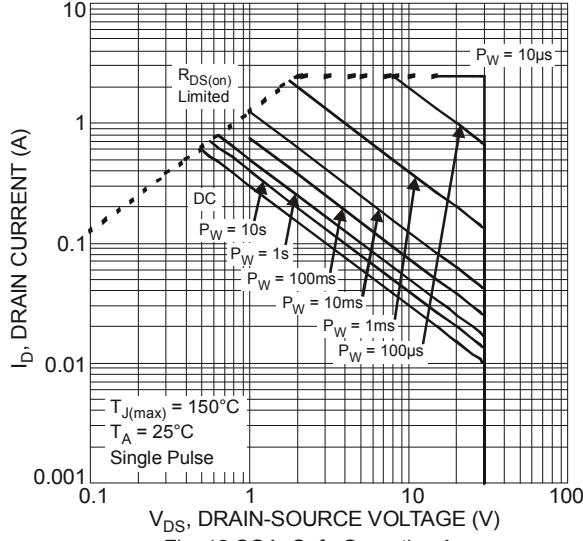


Fig. 12 SOA, Safe Operation Area

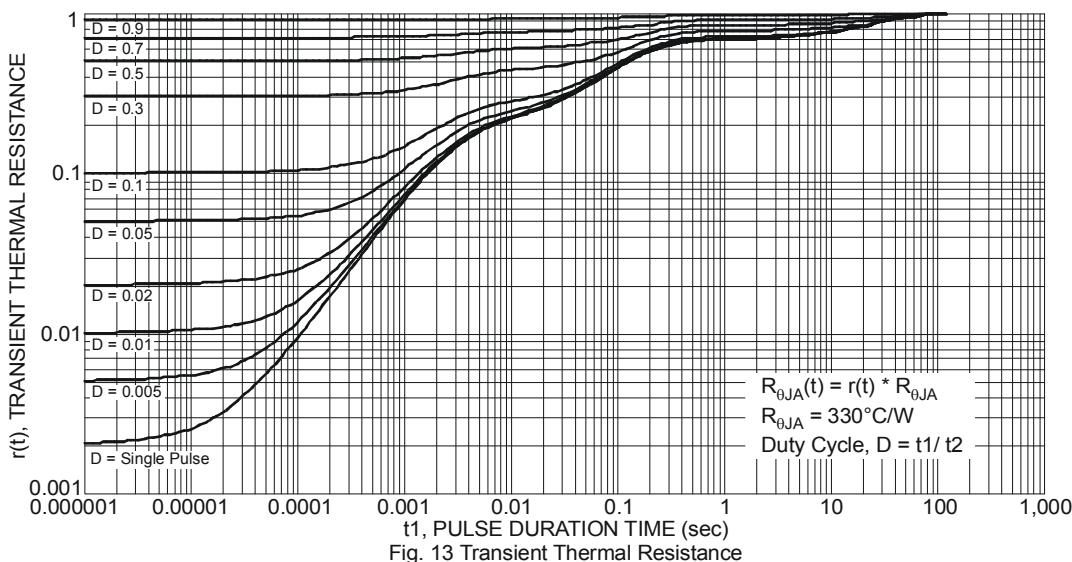
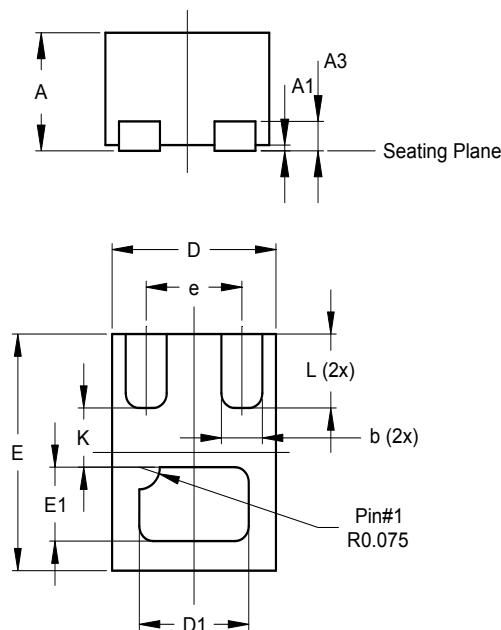


Fig. 13 Transient Thermal Resistance

## Package Outline Dimensions

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

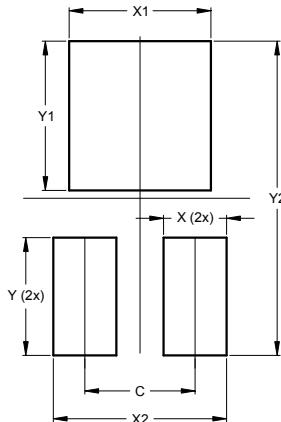


X2-DFN0806-3			
Dim	Min	Max	Typ
A	0.375	0.40	0.39
A1	0	0.05	0.02
A3	-	-	0.10
b	0.10	0.20	0.15
D	0.55	0.65	0.60
D1	0.35	0.45	0.40
E	0.75	0.85	0.80
E1	0.20	0.30	0.25
e	-	-	0.35
K	-	-	0.20
L	0.20	0.30	0.25

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	0.350
X	0.200
X1	0.450
X2	0.550
Y	0.375
Y1	0.475
Y2	1.000

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