

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on) \max}$	$I_D$ $T_A = +25^\circ\text{C}$
12V	0.15Ω @ $V_{GS} = 4.5\text{V}$	1.41A
	0.185Ω @ $V_{GS} = 2.5\text{V}$	1.25A
	0.21Ω @ $V_{GS} = 1.8\text{V}$	1.16A

## Description

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.

## Applications

- DC-DC Converters
- Power management functions

## Features

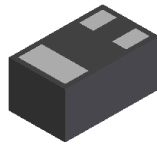
- Low On-Resistance
- Very Low Gate Threshold Voltage  $V_{GS(TH)}$ , 1.0V max
- Low Input Capacitance
- Fast Switching Speed
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

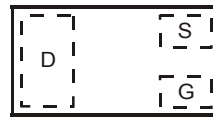
- Case: X1-DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208 <sup>(64)</sup>
- Weight: 0.001 grams (approximate)



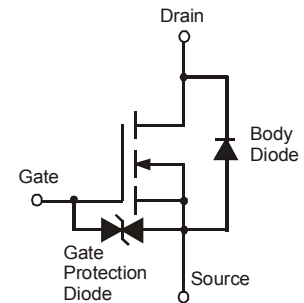
X1-DFN1006-3



Bottom View



Top View  
Internal Schematic



Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN1150UFB-7B	X1-DFN1006-3	10,000/Tape & Reel

- 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> 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>.

## Marking Information



Top View

E5 = Product Type Marking Code  
Bar Denotes Gate and Source Side

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DSS}$	12	V
Gate-Source Voltage			$V_{GSS}$	$\pm 6$	V
Continuous Drain Current (Note 5) $V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	$I_D$	1.41	A
		$T_A = +70^\circ\text{C}$		1.15	
Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%)			$I_{DM}$	7	A
Maximum Body Diode continuous Current			$I_S$	1	A

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	$P_D$	0.5	W
	$T_A = +70^\circ\text{C}$		0.3	
Thermal Resistance, Junction to Ambient (Note 5)		Steady state $R_{\theta JA}$	251	$^\circ\text{C/W}$
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**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	$BV_{DSS}$	12	—	—	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	$V_{DS} = 12\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 1$	$\mu\text{A}$	$V_{GS} = \pm 6\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	0.35	—	1.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	—	150	m $\Omega$	$V_{GS} = 4.5\text{V}, I_D = 1\text{A}$
			—	185		$V_{GS} = 2.5\text{V}, I_D = 1\text{A}$
			—	210		$V_{GS} = 1.8\text{V}, I_D = 1\text{A}$
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	$C_{iss}$	—	106	—	pF	$V_{DS} = 10\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	23	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	21	—	pF	
Gate resistance	$R_g$	—	92.4	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	—	1.5	—	nC	$V_{DS} = 4\text{V}, I_D = 1\text{A}$
Gate-Source Charge	$Q_{gs}$	—	0.2	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	0.2	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	4.1	—	ns	$V_{DD} = 4\text{V}, V_{GS} = 6\text{V}, I_D = 1\text{A}$ $R_G = 1\Omega$
Turn-On Rise Time	$t_r$	—	34.5	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	57	—	ns	
Turn-Off Fall Time	$t_f$	—	30	—	ns	

- Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.  
6. Short duration pulse test used to minimize self-heating effect.  
7. Guaranteed by design. Not subject to product testing.

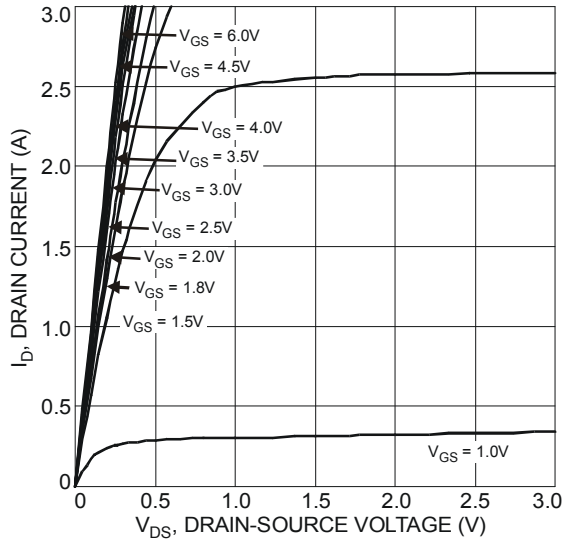


Figure 1 Typical Output Characteristic

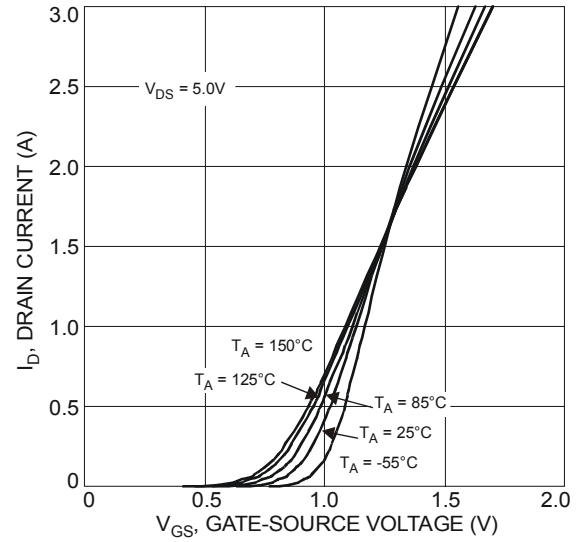


Figure 2 Typical Transfer Characteristics

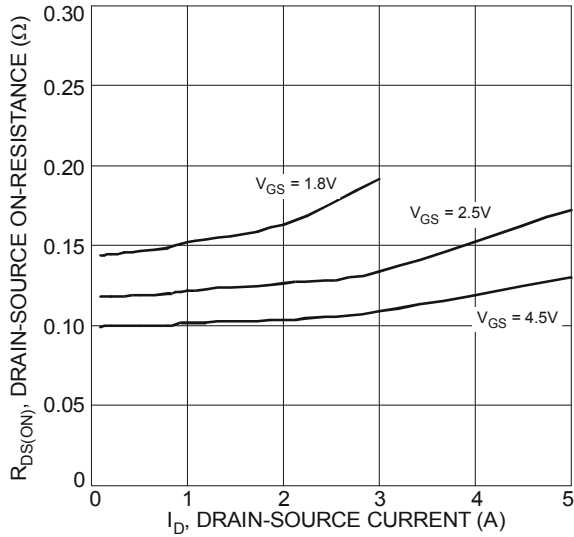


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

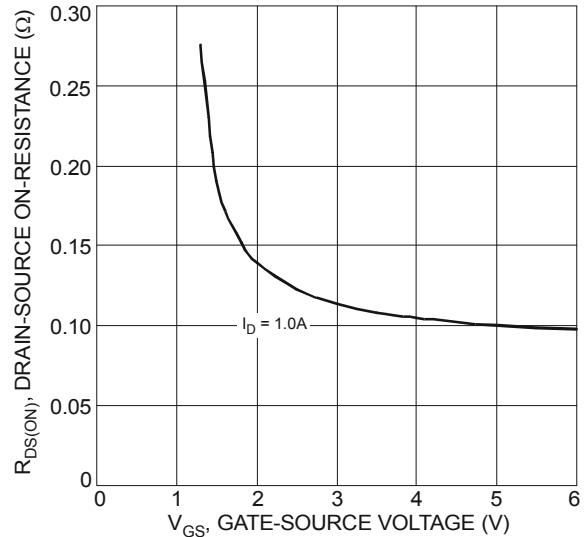


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

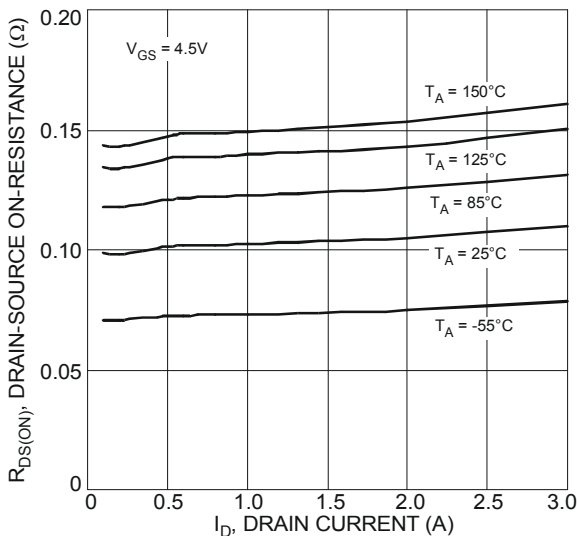


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

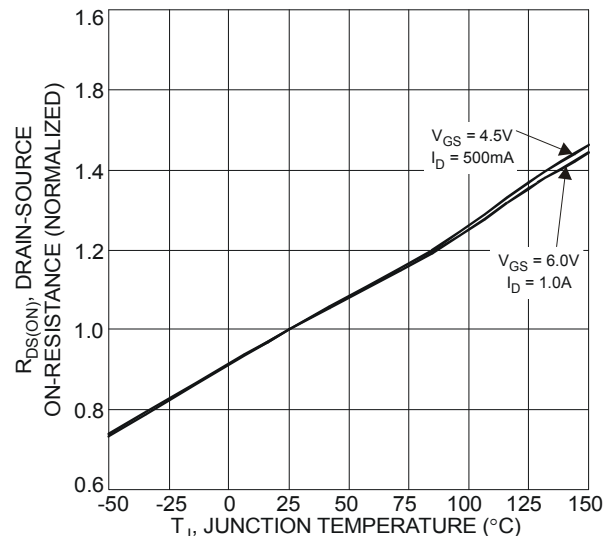


Figure 6 On-Resistance Variation with Temperature

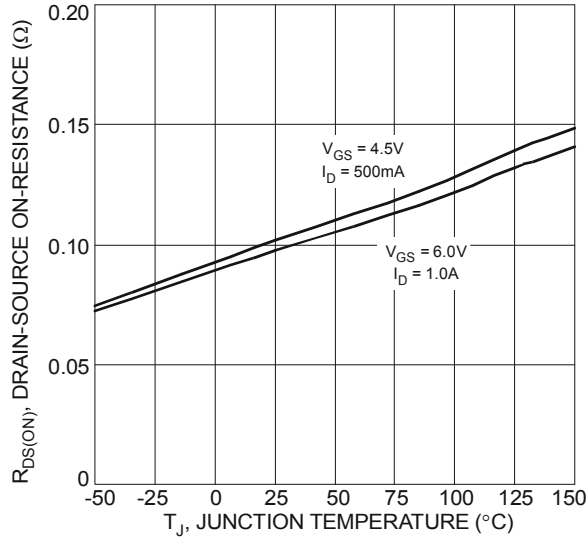


Figure 7 On-Resistance Variation with Temperature

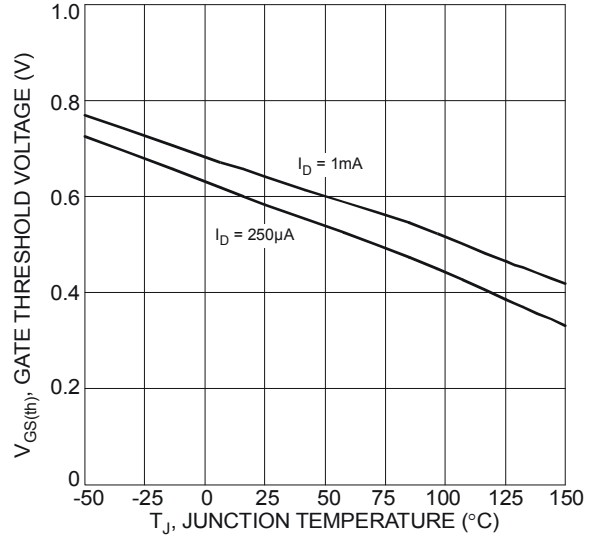


Figure 8 Gate Threshold Variation vs. Ambient Temperature

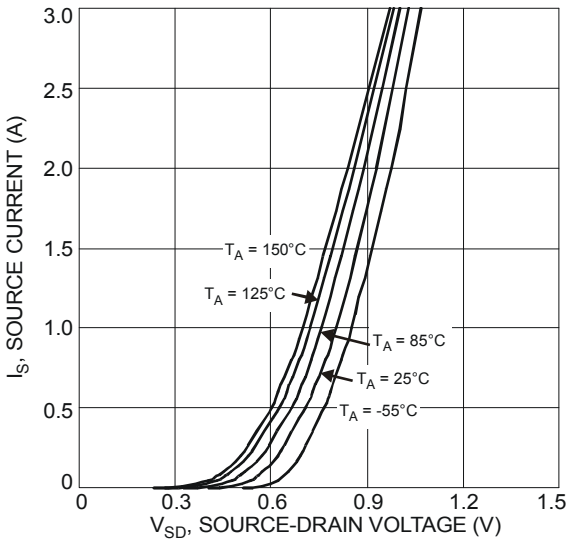


Figure 9 Diode Forward Voltage vs. Current

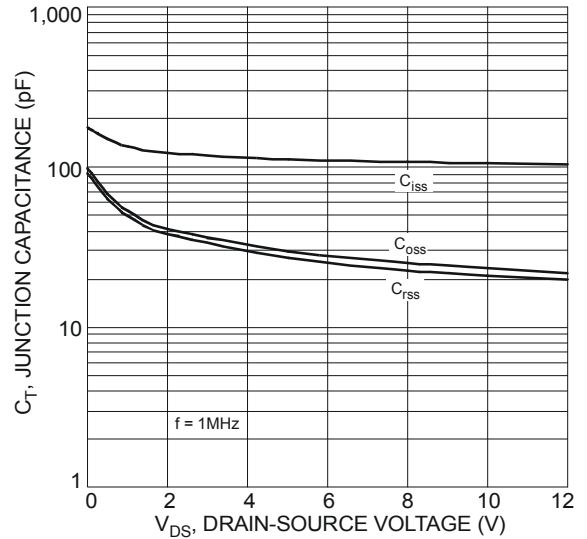


Figure 10 Typical Junction Capacitance

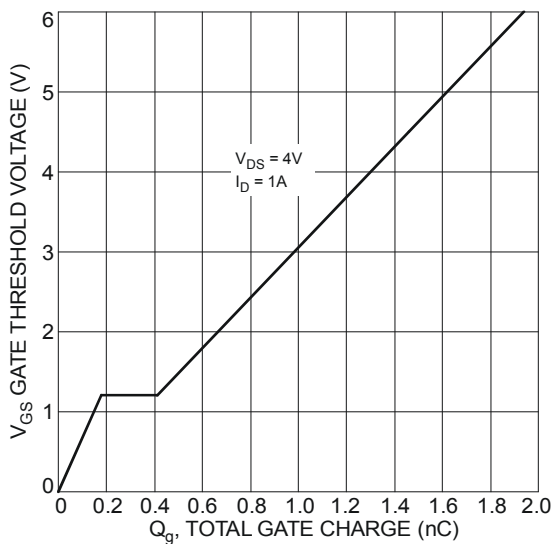


Figure 11 Gate Charge

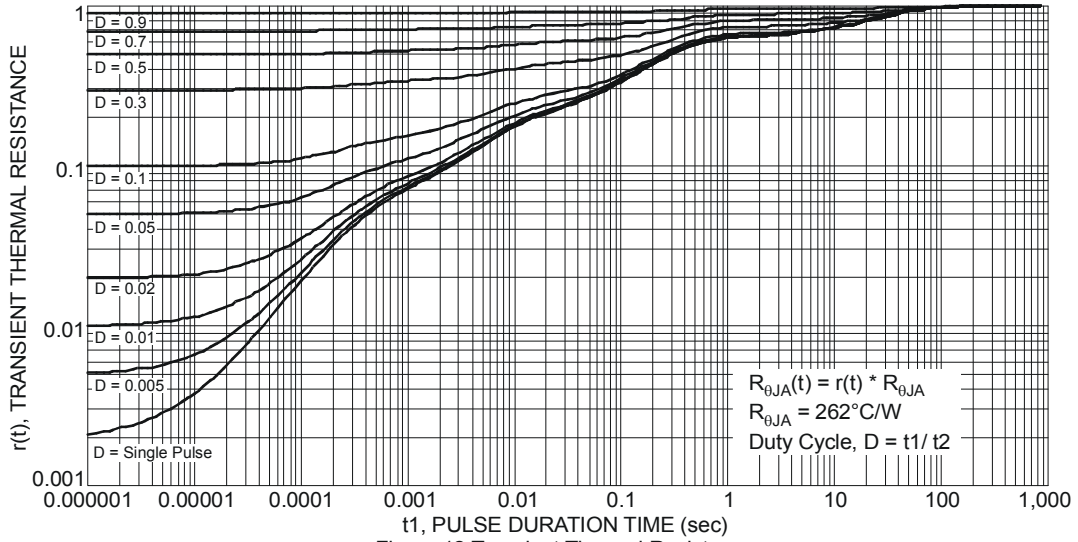
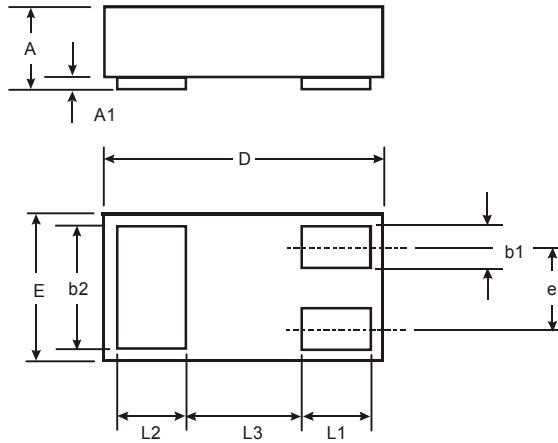


Figure 12 Transient Thermal Resistance

## Package Outline Dimensions

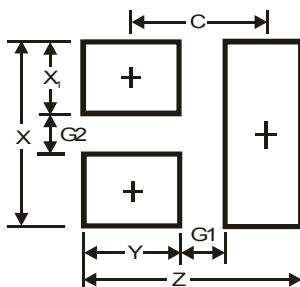
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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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