

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = +25^\circ\text{C}$
-20V	$5\Omega @ V_{GS} = -4.5V$	-200mA
	$7\Omega @ V_{GS} = -2.5V$	-170mA
	$10\Omega @ V_{GS} = -1.8V$	-140mA
	$15\Omega @ V_{GS} = -1.5V$	-50mA

## Description

This new generation MOSFET is designed to minimize the on-state resistance ( $R_{DS(ON)}$ ), yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

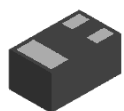
- DC-DC Converters
- Power Management Functions

## Features and Benefits

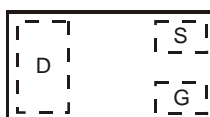
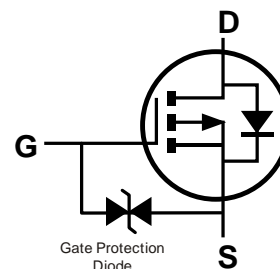
- P-Channel MOSFET
- Low On-Resistance
- Very Low Gate Threshold Voltage  $V_{GS(TH)}$
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surfaced Mount Package
- Ultra-Low Package Profile, 0.4mm Maximum Package Height
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes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

## 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 <sup>(4)</sup>
- Weight: 0.001 grams (Approximate)

**X2-DFN1006-3**


Bottom View


 Top View  
Internal Schematic


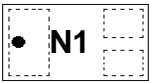
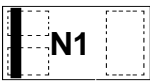
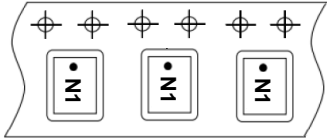
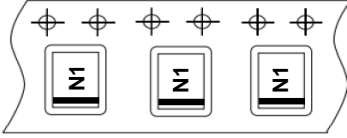
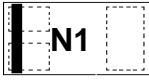
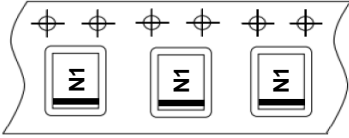
Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP210DUFB4-7	X2-DFN1006-3	3,000/Tape & Reel
DMP210DUFB4-7B	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) 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**

<p><b>DMP210DUFB4-7</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>DMP210DUFB4-7B</b></p>	<div style="text-align: center; margin-bottom: 20px;">  <p>Top View Bar Denotes Gate and Source Side</p> </div> <div style="text-align: center; margin-bottom: 20px;"> <p>N1 = Part Marking Code</p> </div> <div style="text-align: center;">  </div>

**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>	±10	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>	-200 -160	mA
Continuous Drain Current (Note 5) V <sub>GS</sub> = -1.8V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-140 -110	mA
Pulsed Drain Current T <sub>P</sub> = 10μs			I <sub>DM</sub>	-600	mA

**Thermal Characteristics**

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	350	mW
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	357	°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</b> (Note 6)						
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	I <sub>DSS</sub>	—	—	-100 -50	nA nA	V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V V <sub>DS</sub> = -5.0V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100 ±1 ±10	nA μA μA	V <sub>GS</sub> = ±5.0V, V <sub>DS</sub> = 0V V <sub>GS</sub> = ±8.0V, V <sub>DS</sub> = 0V V <sub>GS</sub> = ±10.0V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 6)						
Gate Threshold Voltage @T <sub>J</sub> = +25°C	V <sub>GS(th)</sub>	-0.5	—	-1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Gate Threshold Voltage (Note 7) @T <sub>J</sub> = 0°C	V <sub>GS(th)</sub>	-0.55	—	-1.05	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
@T <sub>J</sub> = +85°C		-0.40	—	-0.90		
@T <sub>J</sub> = +100°C		-0.35	—	-0.85		
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	—	5 7 10 15 20	Ω	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -100mA V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -50mA V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -20mA V <sub>GS</sub> = -1.5V, I <sub>D</sub> = -10mA V <sub>GS</sub> = -1.2V, I <sub>D</sub> = -1mA
Forward Transfer Admittance	Y <sub>fs</sub>	—	200	—	mS	V <sub>DS</sub> = -10V, I <sub>D</sub> = -200mA
Diode Forward Voltage (Note 5)	V <sub>SD</sub>	-0.5	—	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -115mA
<b>DYNAMIC CHARACTERISTICS</b> (Note 7)						
Input Capacitance	C <sub>ISS</sub>	—	13.72	175	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>OSS</sub>	—	4.01	30	pF	
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	2.34	20	pF	
<b>SWITCHING CHARACTERISTICS</b> (Note 7)						
Turn-On Delay Time	t <sub>d(on)</sub>	—	7.7	—	nS	V <sub>GS</sub> = -4.5V, V <sub>DD</sub> = -15V I <sub>D</sub> = -180mA, R <sub>G</sub> = 2.0Ω
Rise Time	t <sub>r</sub>	—	19.3	—		
Turn-Off Delay Time	t <sub>d(off)</sub>	—	25.9	—		
Fall Time	t <sub>f</sub>	—	31.5	—		

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

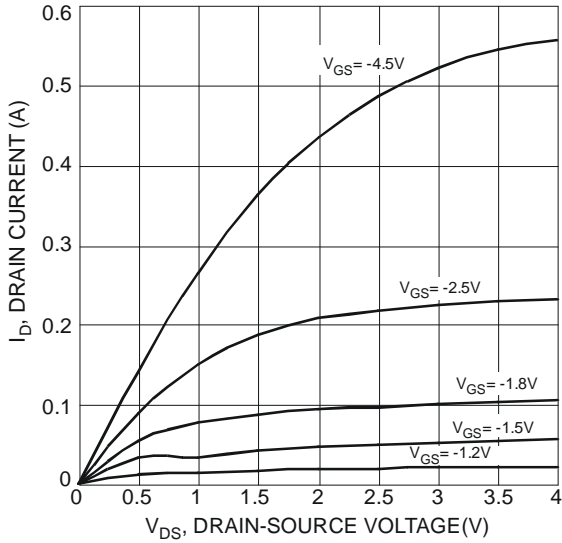


Fig. 1 Typical Output Characteristics

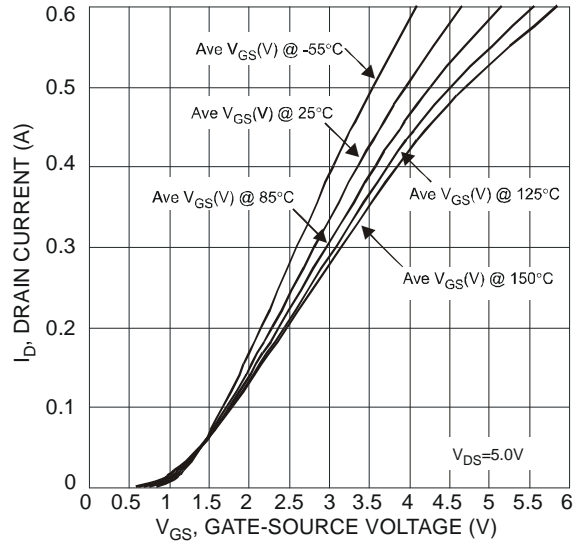


Fig. 2 Typical Transfer Characteristics

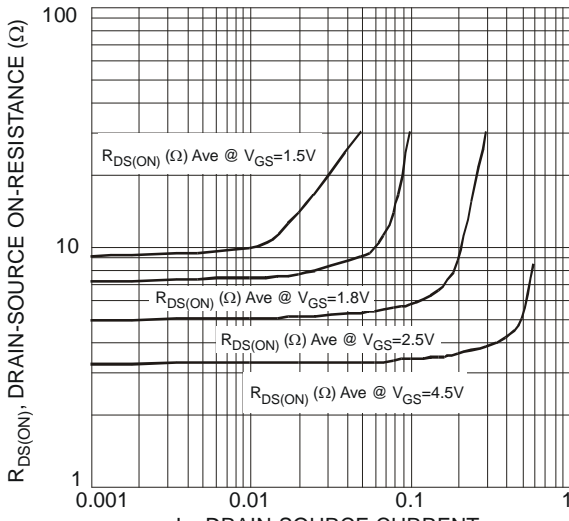


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

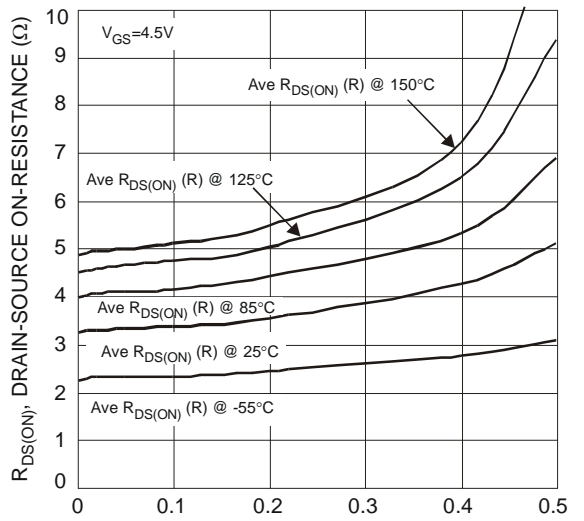


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

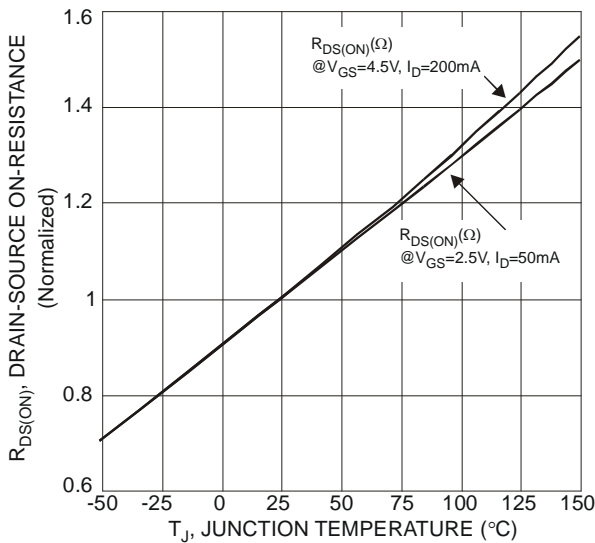


Fig. 5 On-Resistance Variation with Temperature

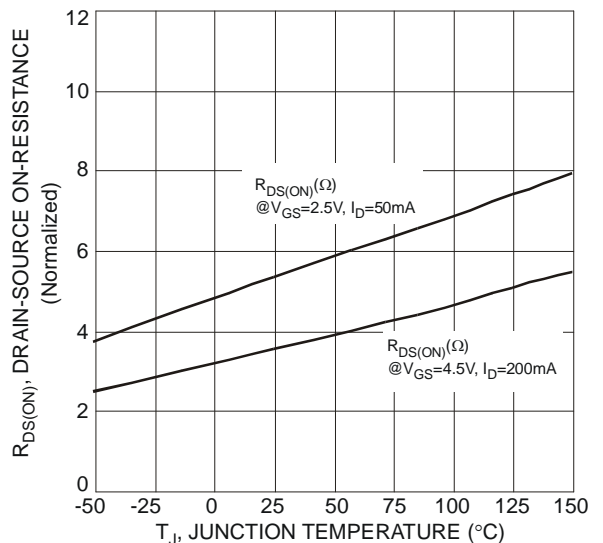


Fig. 6 On-Resistance vs. Temperature

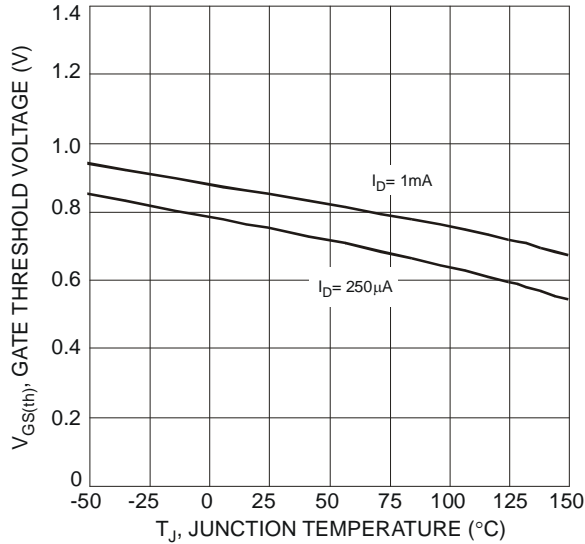


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

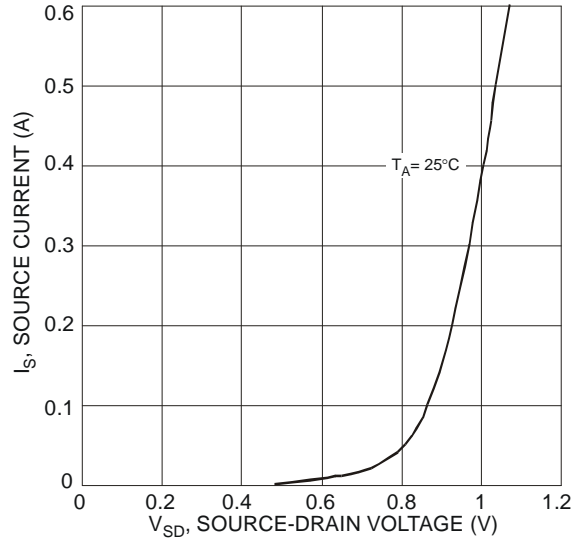


Fig. 8 Diode Forward Voltage vs. Current

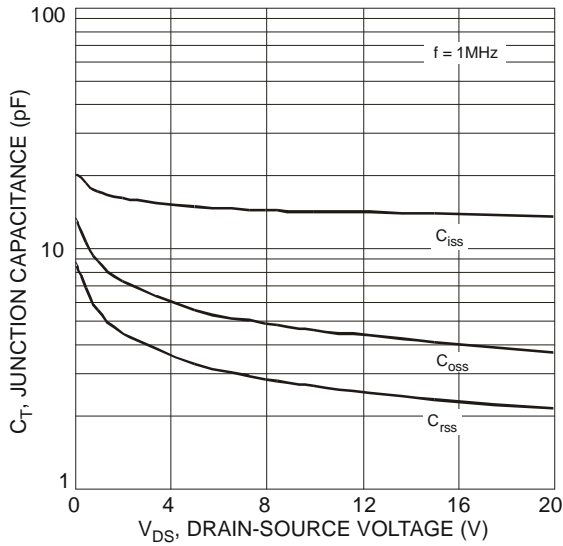


Fig. 9 Typical Junction Capacitance

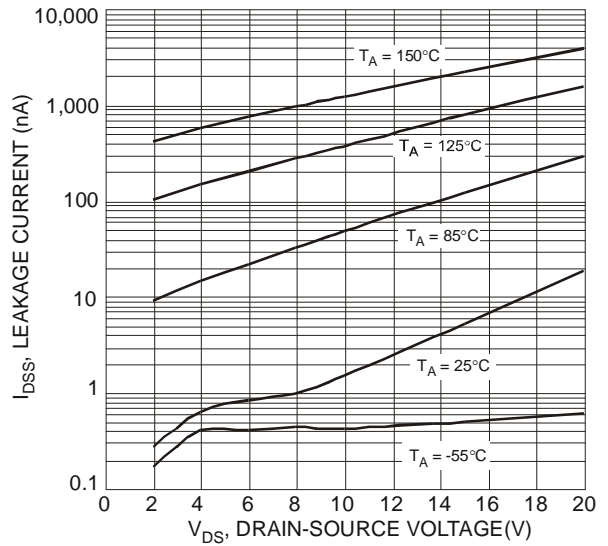


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

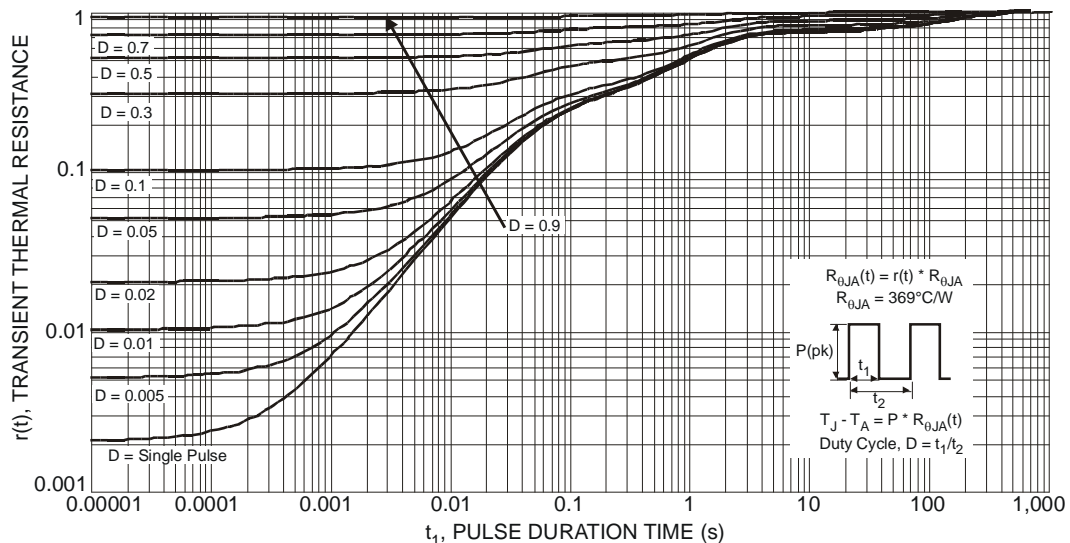
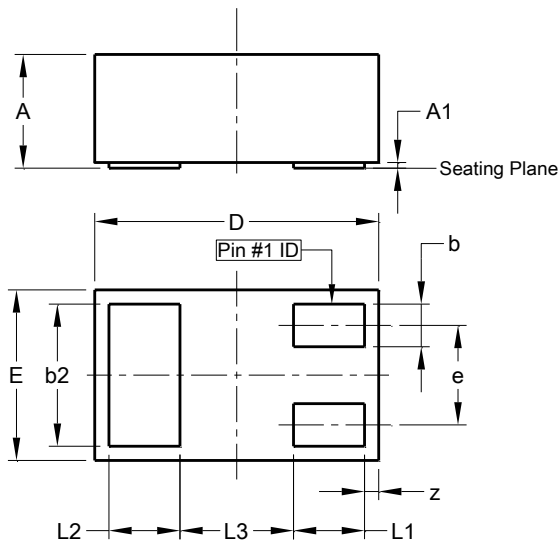


Fig. 11 Transient Thermal Response

## Package Outline Dimensions

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

**X2-DFN1006-3**

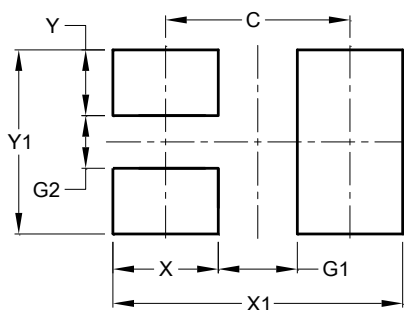


X2-DFN1006-3			
Dim	Min	Max	Typ
A	—	0.40	—
A1	0.00	0.05	0.03
b	0.10	0.20	0.15
b2	0.45	0.55	0.50
D	0.95	1.05	1.00
E	0.55	0.65	0.60
e	-	-	0.35
L1	0.20	0.30	0.25
L2	0.20	0.30	0.25
L3	-	-	0.40
z	0.02	0.08	0.05
<b>All Dimensions in mm</b>			

## Suggested Pad Layout

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