

NEW PRODUCT

### Product Summary

$V_{(BR)DSS}$	$R_{DS(ON) \text{ max}}$	$I_D \text{ max}$ $T_A = +25^\circ\text{C}$
30V	1.5Ω @ $V_{GS} = 4.5\text{V}$	0.22A
	2.0Ω @ $V_{GS} = 2.5\text{V}$	
	3.0Ω @ $V_{GS} = 1.8\text{V}$	
	4.5Ω @ $V_{GS} = 1.5\text{V}$	

### 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

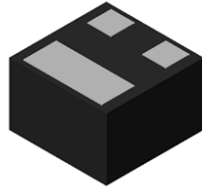
- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

### Features and Benefits

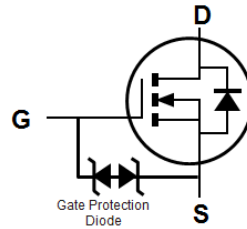
- Low Package Profile, 0.42mm Maximum Package Height
- 0.62mm x 0.62mm Package Footprint
- Low On-Resistance
- Very Low Gate Threshold Voltage, 1.0V max
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

### Mechanical Data

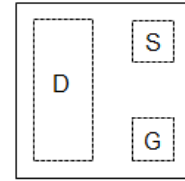
- Case: X2-DFN0606-3
- Case Material: Molded Plastic, "Green" Molding Compound  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper leadframe  
Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.001 grams (approximate)



Bottom View



Equivalent Circuit



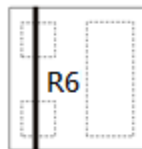
Top View  
Package Pin Configuration

### Ordering Information (Note 4)

Part Number	Case	Packaging
DMN31D5UFZ-7B	X2-DFN0606-3	10K/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



R6 = Product Type Marking Code

Top View  
Bar Denotes Gate  
and Source Side

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	30	V
Gate-Source Voltage			V <sub>GSS</sub>	±12	V
Continuous Drain Current (Note 5)	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	220	mA
		T <sub>A</sub> = +85°C		150	
Pulsed Drain Current (Note 6)			I <sub>DM</sub>	500	mA

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	Steady state	P <sub>D</sub>	393	mW
Thermal Resistance, Junction to Ambient (Note 5)		R <sub>θJA</sub>	318	°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 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	100	nA	@T <sub>C</sub> = +25°C V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	μA	V <sub>GS</sub> = ±10V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.4	—	1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	—	1.5	Ω	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 100mA
		—	—	2.0		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 50mA
		—	—	3.0		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 20mA
		—	—	4.5		V <sub>GS</sub> = 1.5V, I <sub>D</sub> = 10mA
		—	2.8	—		V <sub>GS</sub> = 1.2V, I <sub>D</sub> = 1mA
Diode Forward Voltage	V <sub>SD</sub>	—	0.75	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 10mA
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	22.2	—	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	2.9	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	2.2	—	pF	
Total Gate Charge	Q <sub>g</sub>	—	0.35	—	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 15V, I <sub>D</sub> = 200mA
Gate-Source Charge	Q <sub>gs</sub>	—	0.05	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	0.02	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	3.1	—	ns	V <sub>DD</sub> = 10V, V <sub>GS</sub> = 4.5V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = 200mA
Turn-On Rise Time	t <sub>r</sub>	—	2.0	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	20	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	6.9	—	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.

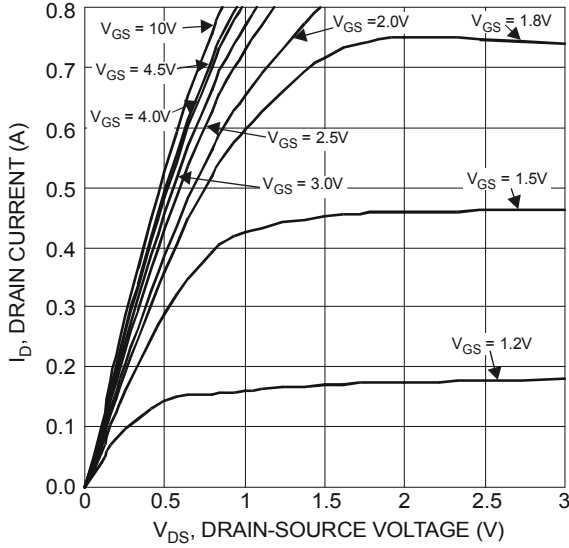


Figure 1 Typical Output Characteristics

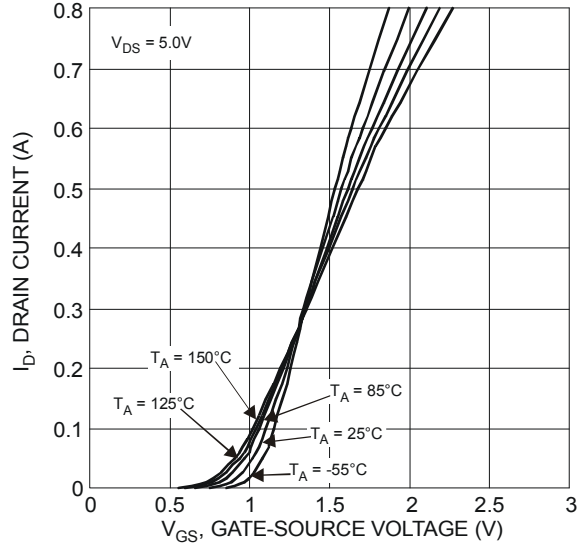


Figure 2 Typical Transfer Characteristics

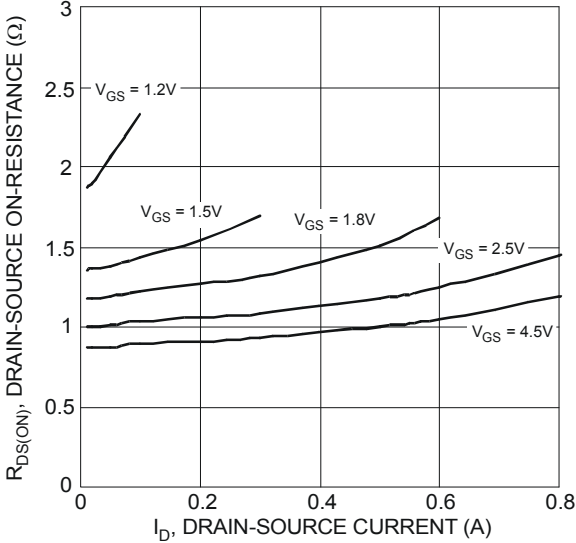


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

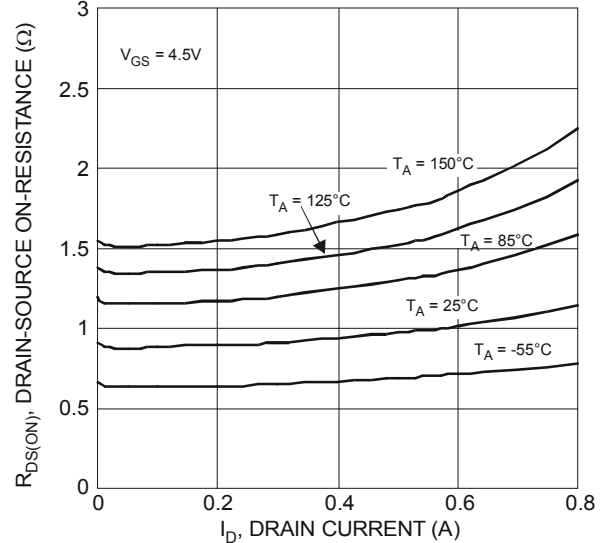


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

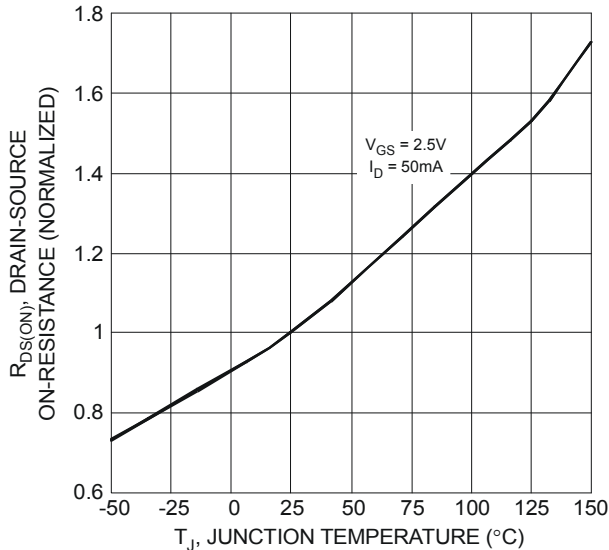


Figure 5 On-Resistance Variation with Temperature

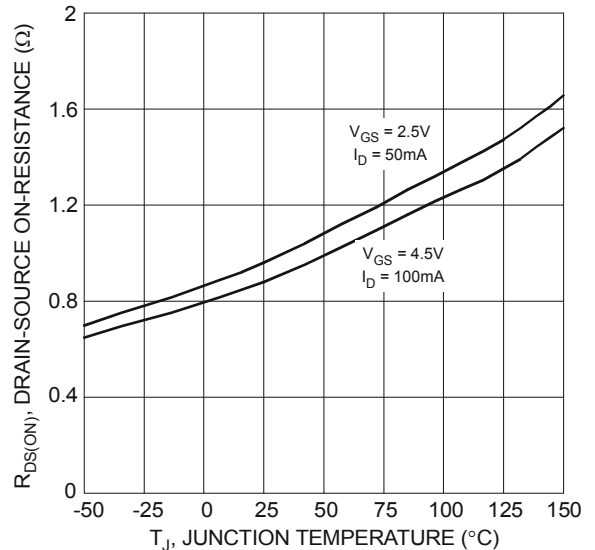


Figure 6 On-Resistance Variation with Temperature

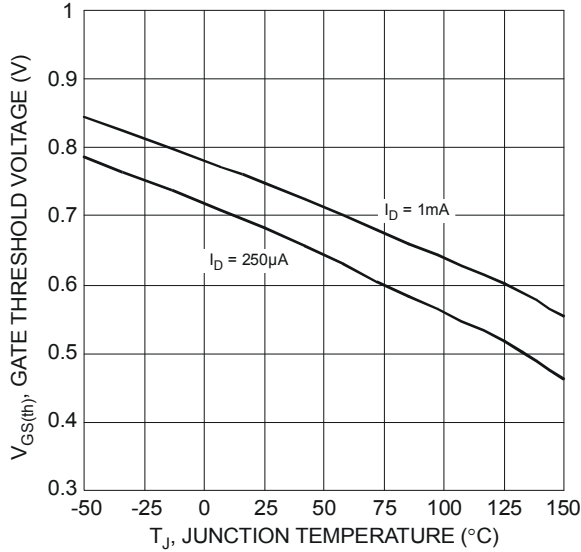


Figure 7 Gate Threshold Variation vs. Ambient Temperature

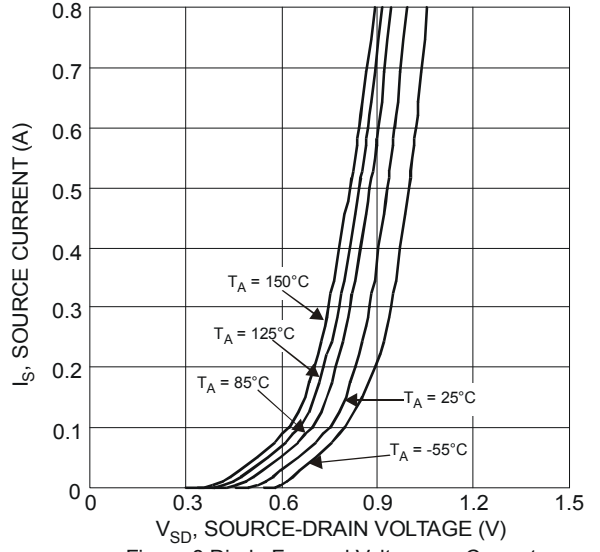


Figure 8 Diode Forward Voltage vs. Current

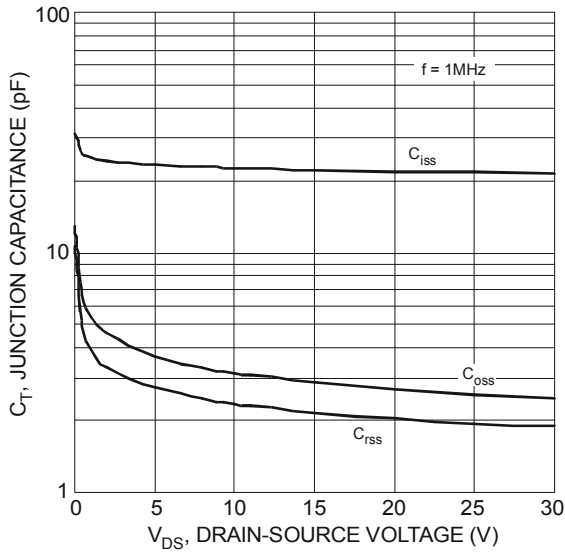


Figure 9 Typical Junction Capacitance

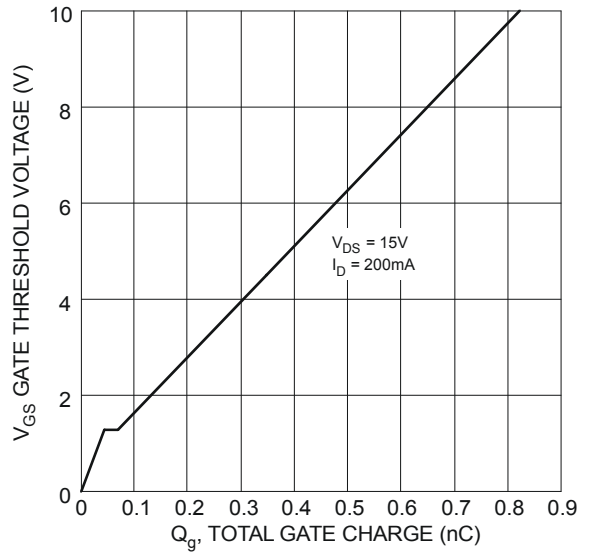


Figure 10 Gate Charge

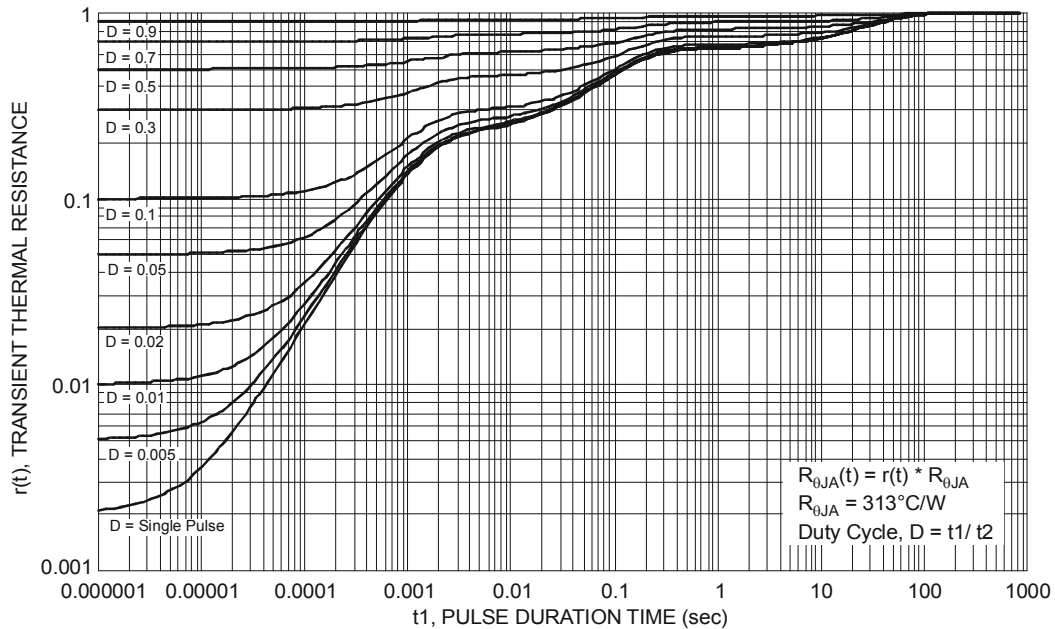
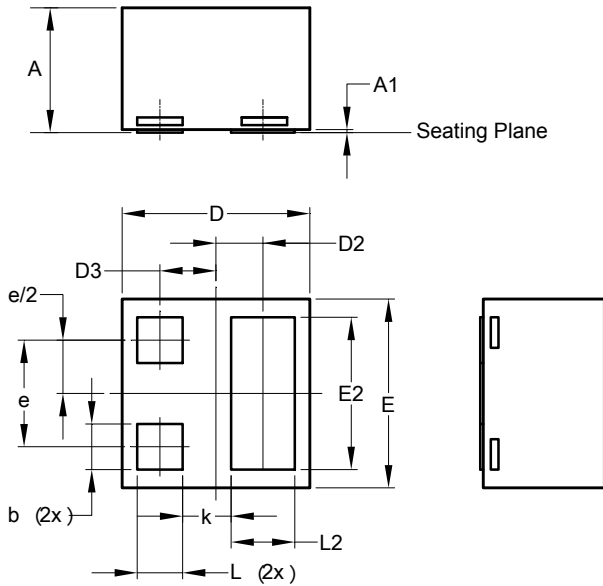


Figure 11 Transient Thermal Resistance

**Package Outline Dimensions**

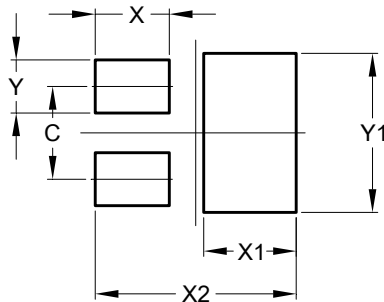
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



X2-DFN0606-3			
Dim	Min	Max	Typ
A	0.36	0.42	0.39
A1	0	0.05	0.02
b	0.10	0.20	0.15
D	0.57	0.67	0.62
D2	0.155 BSC		
D3	0.185 BSC		
E	0.57	0.67	0.62
E2	0.40	0.60	0.50
e	0.35 BSC		
k	0.16 REF		
L	0.09	0.21	0.15
L2	0.11	0.31	0.21
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	0.280
X1	0.350
X2	0.760
Y	0.200
Y1	0.600

NEW PRODUCT

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