

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = +25^\circ\text{C}$
-25V	10Ω @ $V_{GS} = -4.5\text{V}$	-166mA
	13Ω @ $V_{GS} = -2.7\text{V}$	-138mA

## 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 Gate (>6kV Human Body Mode)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Mechanical Data

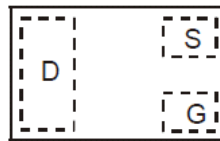
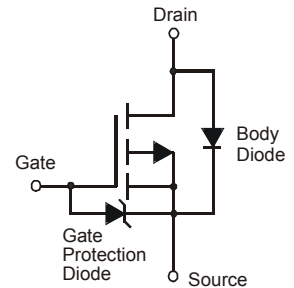
- Case: X2-DFN0806-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208 <sup>(e4)</sup>
- Weight: 0.00043 grams (approximate)



X2-DFN0806-3



Bottom View


 Top View  
Package Pin Configuration


Equivalent Circuit

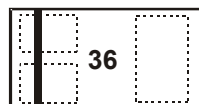
## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP213DUFA-7B	X2-DFN0806-3	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

DMN213DUFA-7B


 Top View  
Bar Denotes Gate  
and Source Side

36 = Product Type Marking Code

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

Characteristic		Symbol	Value	Unit	
Drain-Source Voltage		$V_{DSS}$	-25	V	
Gate-Source Voltage		$V_{GSS}$	-8		
Continuous Drain Current	$V_{GS} = 4.5\text{V}$	(Note 6)	-166	mA	
		$T_A = +70^\circ\text{C}$ (Note 6)	-125		
		(Note 5)	$I_D$	-145	mA
Pulsed Drain Current		(Note 7)	$I_{DM}$	-500	mA

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	$P_D$	360	mW
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	353	$^\circ\text{C}/\text{W}$
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 7)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-25	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	-1	$\mu\text{A}$	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	-100	nA	$V_{GS} = -8\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	-0.65	-0.9	-1.5	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	—	10	$\Omega$	$V_{GS} = -4.5\text{V}, I_D = -0.2\text{A}$
		—	—	13		$V_{GS} = -2.7\text{V}, I_D = -0.05\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	—	189	—	S	$V_{DS} = -5\text{V}, I_D = -0.2\text{A}$
Diode Forward Voltage	$V_{SD}$	—	—	-1.5	V	$V_{GS} = 0\text{V}, I_S = -0.2\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{iss}$	—	27.2	—	pF	$V_{DS} = -10\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance	$C_{oss}$	—	6.1	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	1.7	—	pF	
Total Gate Charge	$Q_g$	—	0.35	—	nC	$V_{DS} = -5\text{V}, I_D = -0.2\text{A}, V_{GS} = -4.5\text{V}$
Gate-Source Charge	$Q_{gs}$	—	0.08	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	0.06	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	4.5	—	ns	$V_{DS} = -6\text{V}, V_{GS} = -4.5\text{V}, I_D = -0.2\text{A}, R_G = 50\Omega$
Turn-On Rise Time	$t_r$	—	2.3	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	24.1	—	ns	
Turn-Off Fall Time	$t_f$	—	11	—	ns	

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

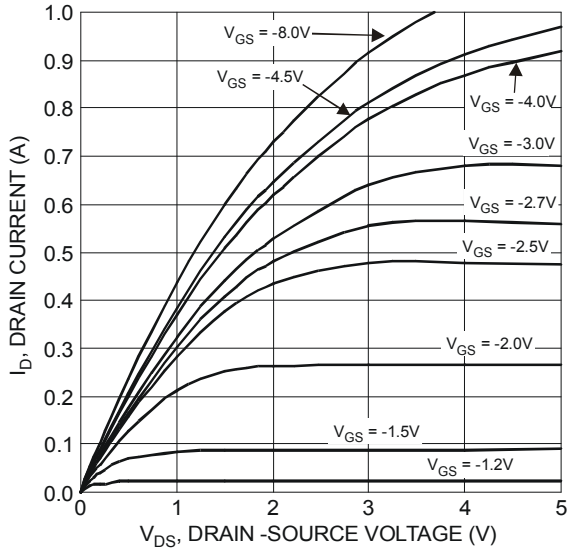


Figure 1 Typical Output Characteristics

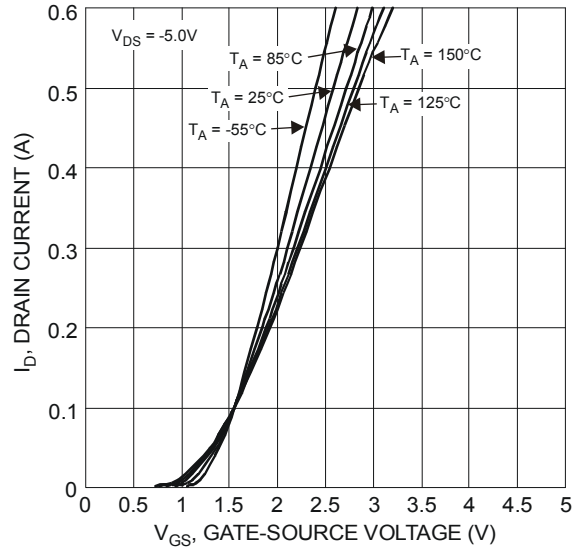


Figure 2 Typical Transfer Characteristics

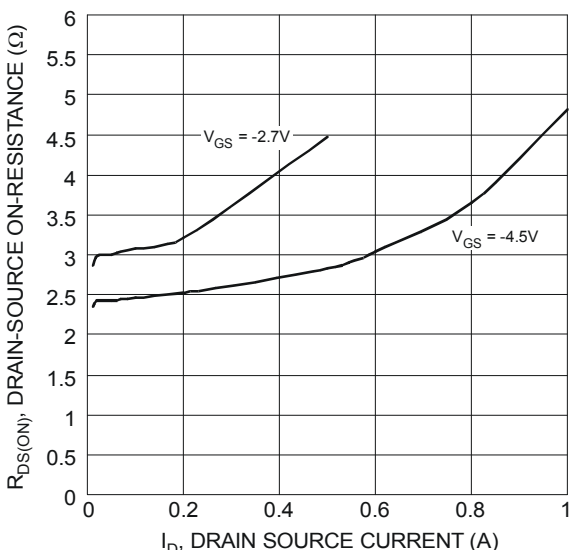


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

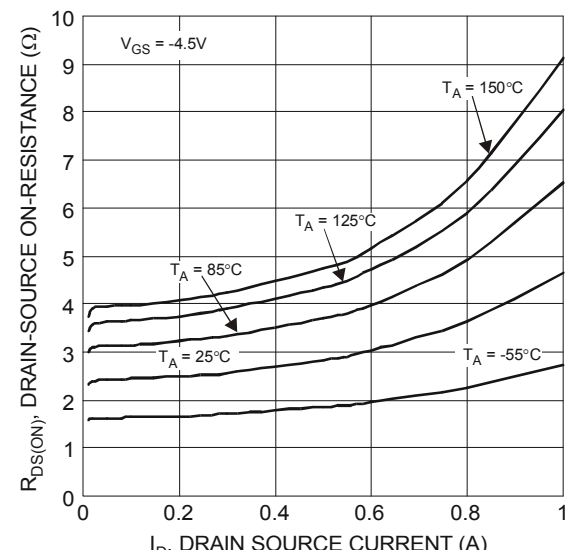


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

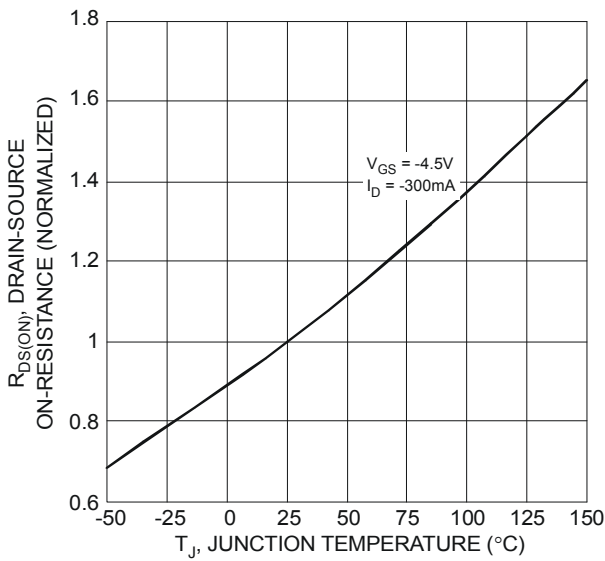


Figure 5 On-Resistance Variation with Temperature

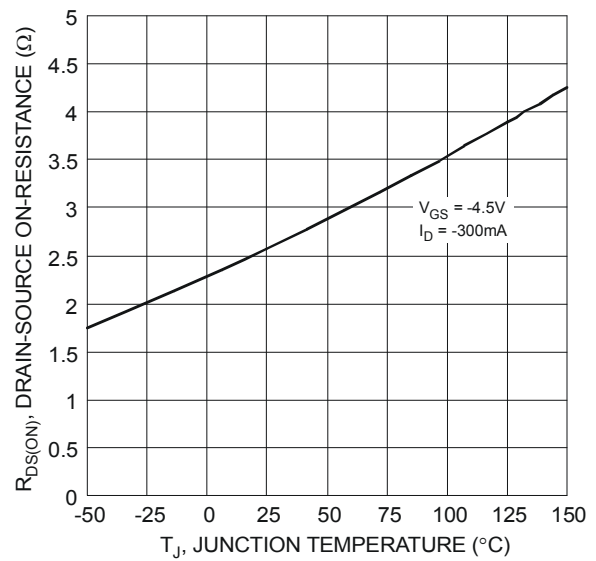


Figure 6 On-Resistance Variation with Temperature

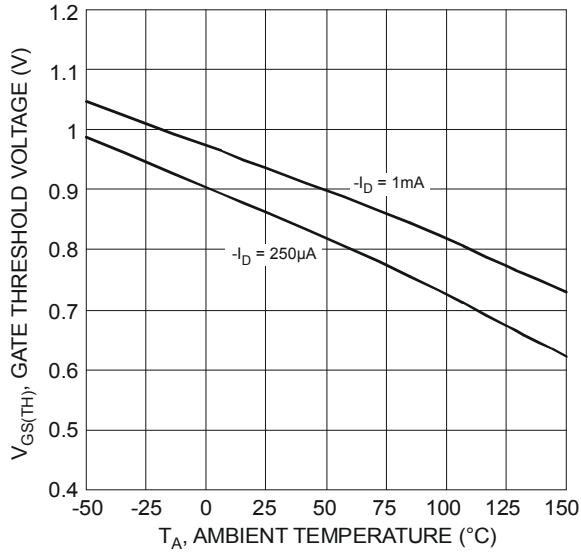


Figure 7 Gate Threshold Variation vs. Ambient Temperature

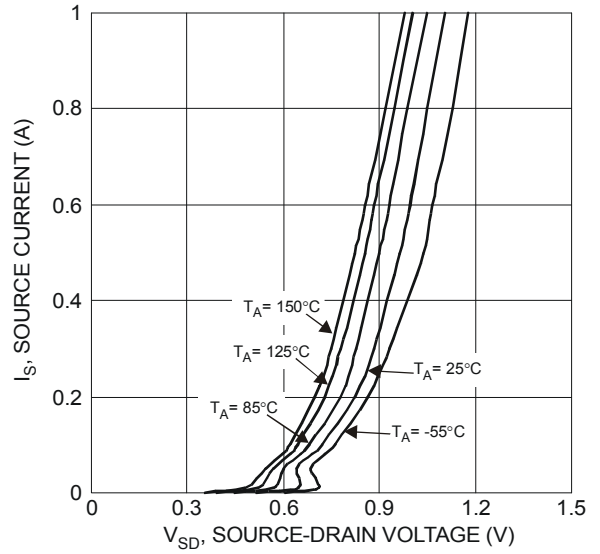


Figure 8 Diode Forward Voltage vs. Current

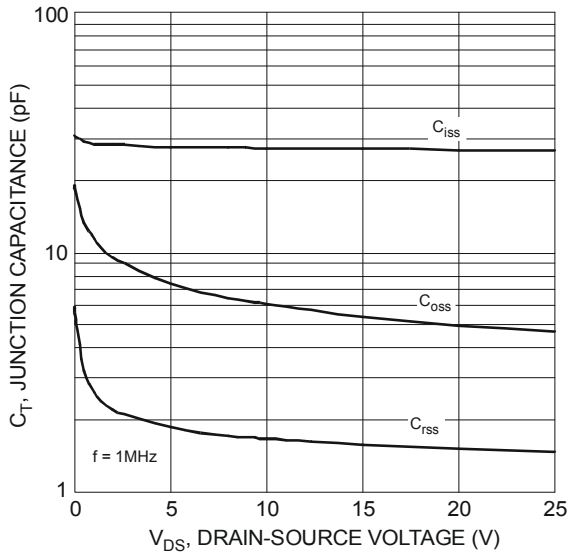


Figure 9 Typical Junction Capacitance

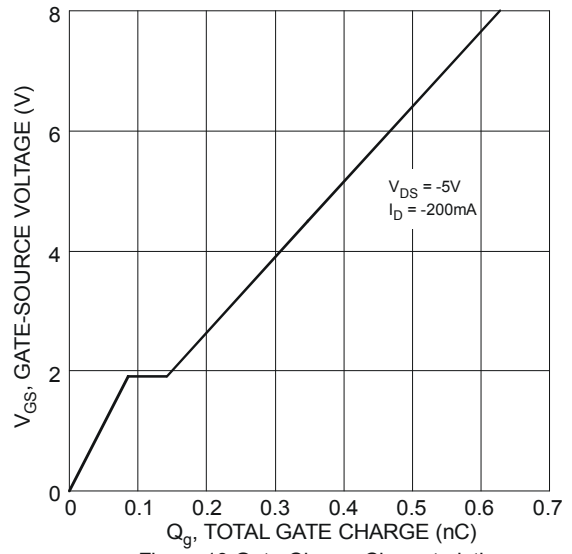


Figure 10 Gate-Charge Characteristics

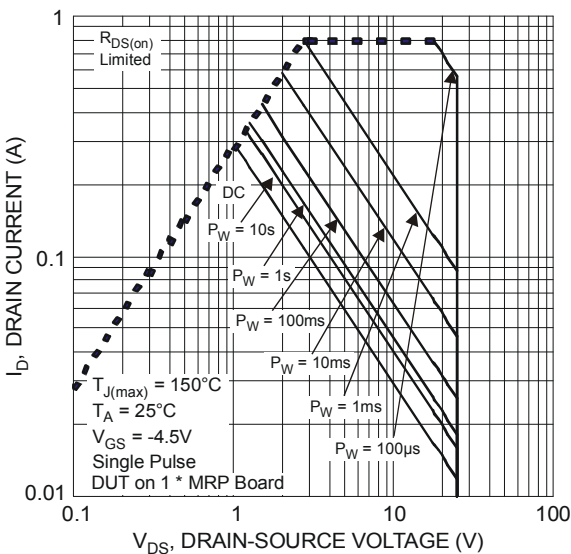
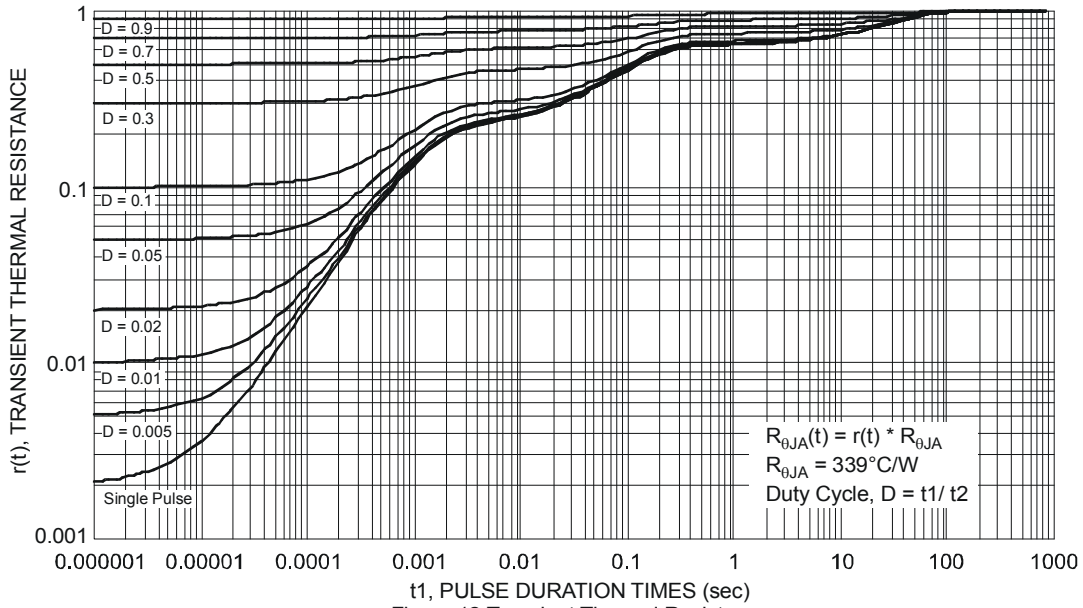
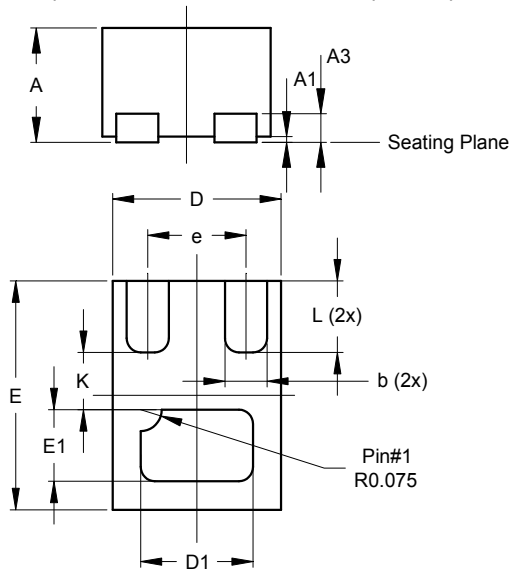


Figure 11 SOA, Safe Operation Area



**Package Outline Dimensions**

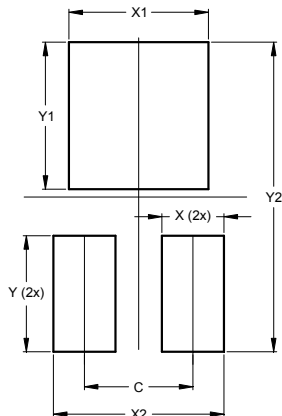
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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