

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = +25^\circ\text{C}$
12V	45mΩ @ $V_{GS} = 4.5\text{V}$	3.2A
	64mΩ @ $V_{GS} = 2.5\text{V}$	
	85mΩ @ $V_{GS} = 1.8\text{V}$	
	100mΩ @ $V_{GS} = 1.5\text{V}$	

## Description and Applications

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.

- Power Management Functions
- Backlighting
- Load Switch

## Features and Benefits

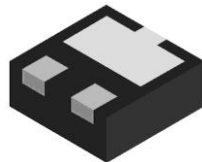
- Low On-Resistance
- Low Input/Output Leakage
- Fast Switching Speed
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Mechanical Data

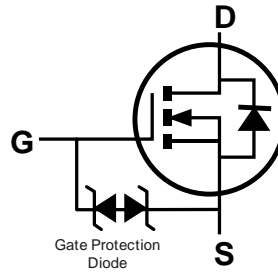
- Case: X2-DFN1010-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish NiPdAu Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.0015 Grams (Approximate)



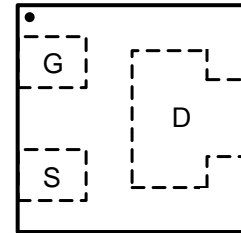
X2-DFN1010-3



Bottom View



Equivalent Circuit



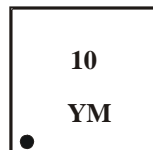
Pin-out Top View

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN1045UFR4-7	X2-DFN1010-3	3000/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



10 = Product Type Marking Code  
YM = Date Code Marking  
Y = Year (ex: B = 2014)  
M = Month (ex: 9 = September)

### Date Code Key

Year	2014	2015	2016	2017	2018	2019	2020
Code	B	C	D	E	F	G	H

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	12	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	3.2	A
		T <sub>A</sub> = +70°C		2.5	
Pulsed Drain Current (10μs pulse, Duty cycle = 1%)			I <sub>DM</sub>	15	A

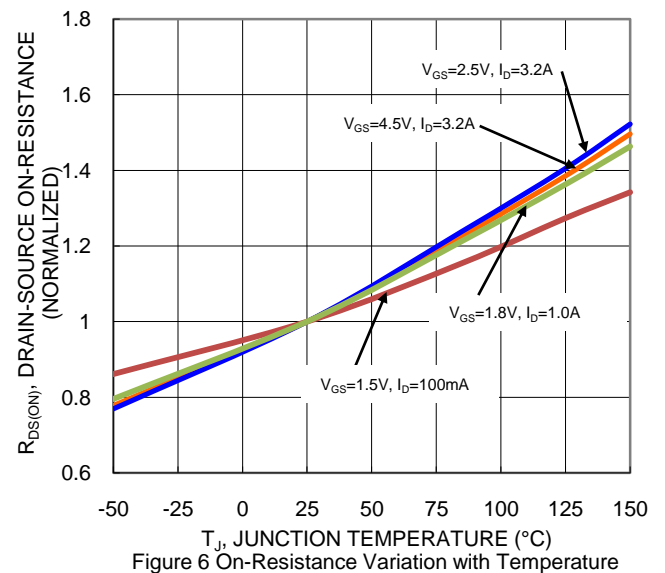
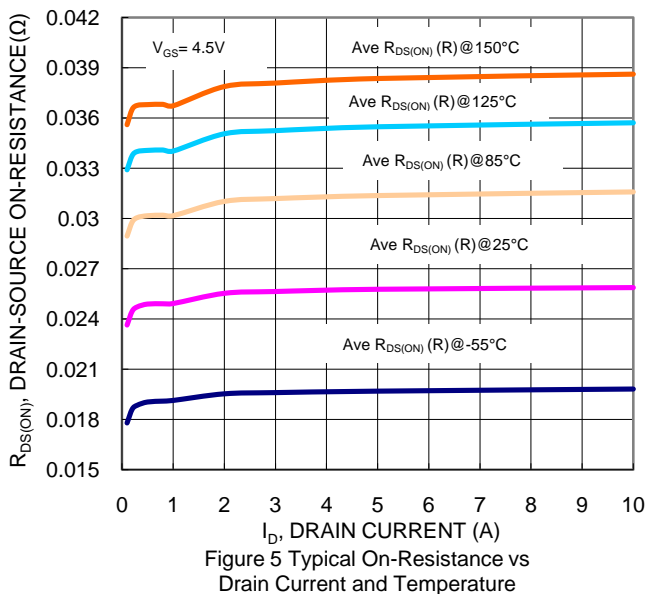
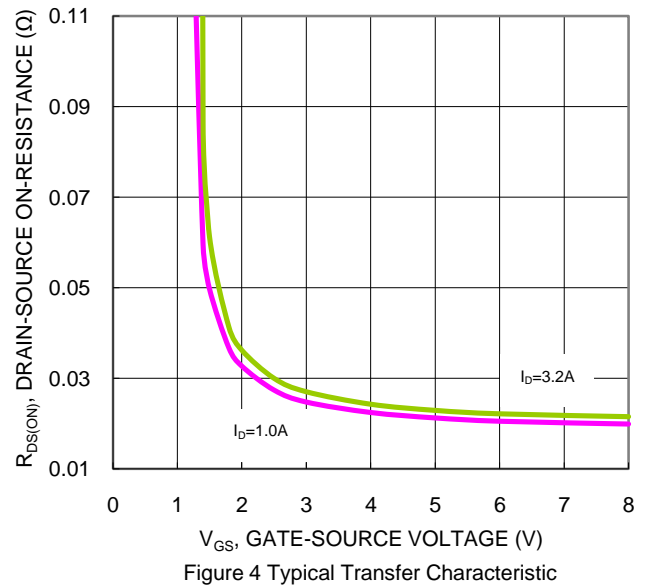
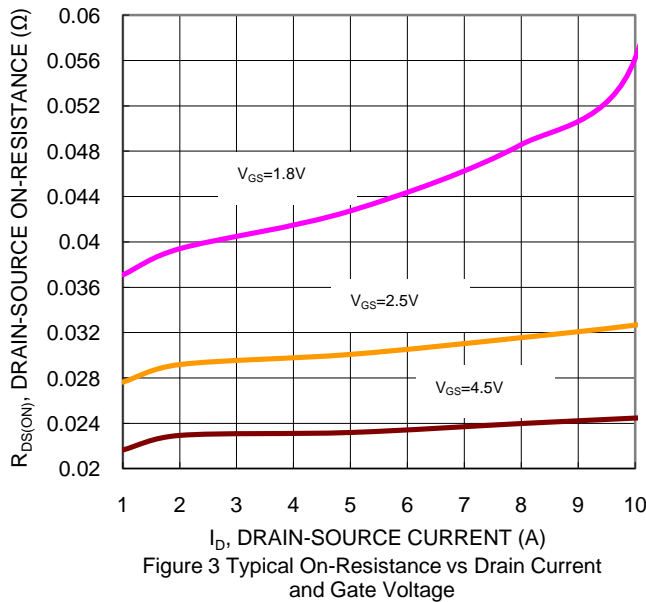
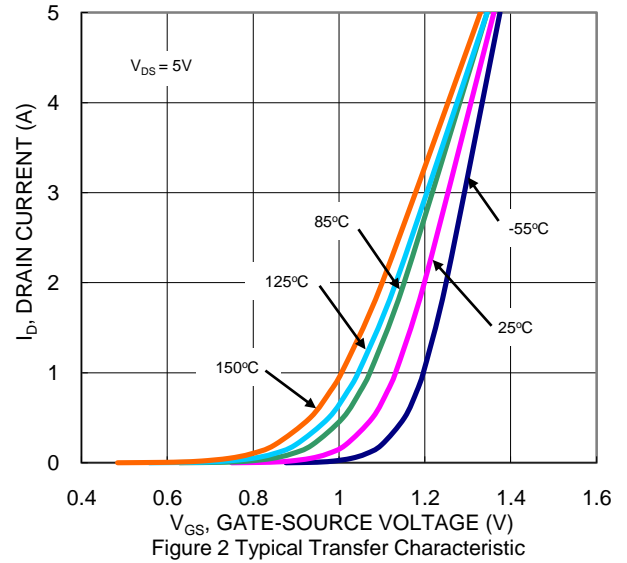
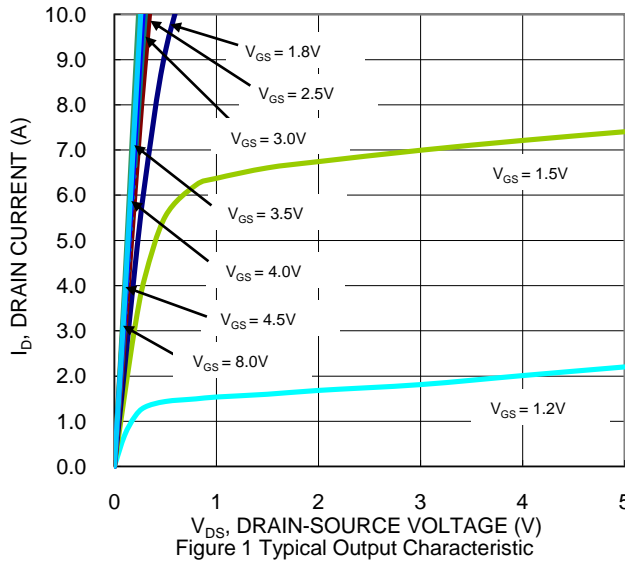
**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	0.5	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5)	R <sub>θJA</sub>	251	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	1.26	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6)	R <sub>θJA</sub>	99	°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>	12	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 12V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	μA	V <sub>GS</sub> = ±8V, 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>	—	25	45	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.2A
			32	64		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 3.2A
			40	85		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 1A
			50	100		V <sub>GS</sub> = 1.5V, I <sub>D</sub> = 0.1A
Diode Forward Voltage	V <sub>SD</sub>	—	—	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.0A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iSS</sub>	—	375	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	57	—	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	51	—	pF	
Total Gate Charge	Q <sub>g</sub>	—	4.8	—	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V I <sub>D</sub> = 3.2A
Gate-Source Charge	Q <sub>gs</sub>	—	0.6	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	1.2	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	7	—	ns	V <sub>DD</sub> = 10V, V <sub>GEN</sub> = 4.5V, R <sub>GEN</sub> = 6Ω, I <sub>D</sub> = 3.2A
Turn-On Rise Time	t <sub>r</sub>	—	25	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	93	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	48	—	ns	

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



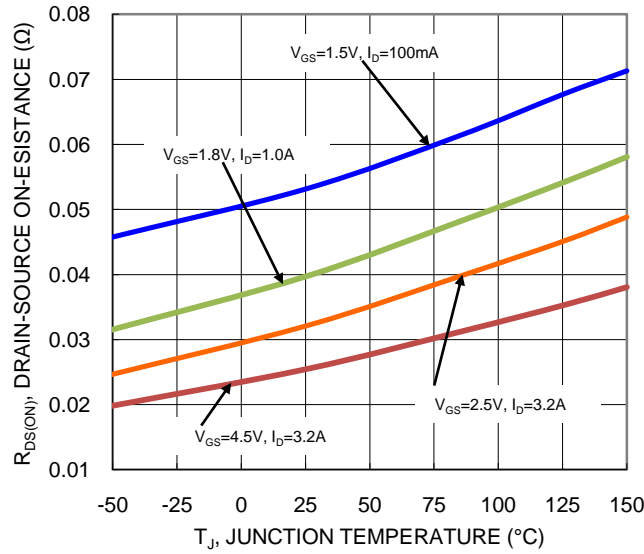


Figure 7 On-Resistance Variation with Temperature

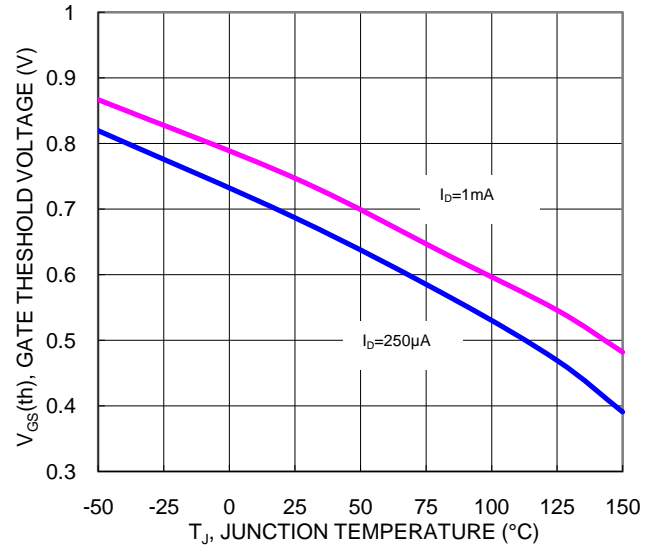


Figure 8 Gate Threshold Variation vs Ambient Temperature

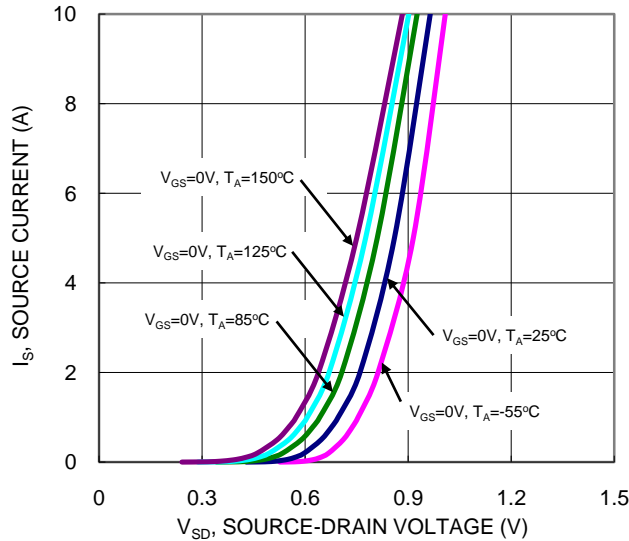


Figure 9 Diode Forward Voltage vs. Current

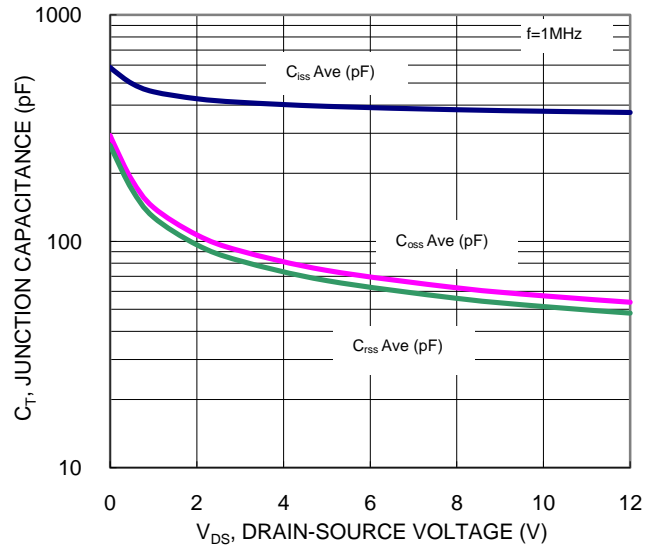


Figure 10 Typical Junction Capacitance

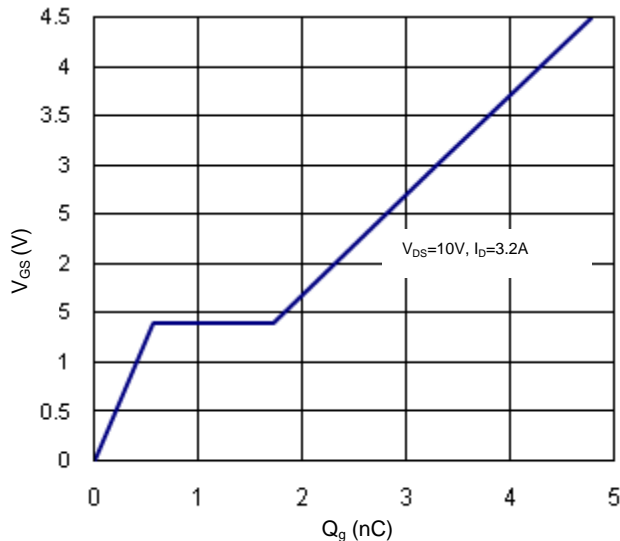


Figure 11 Gate Charge

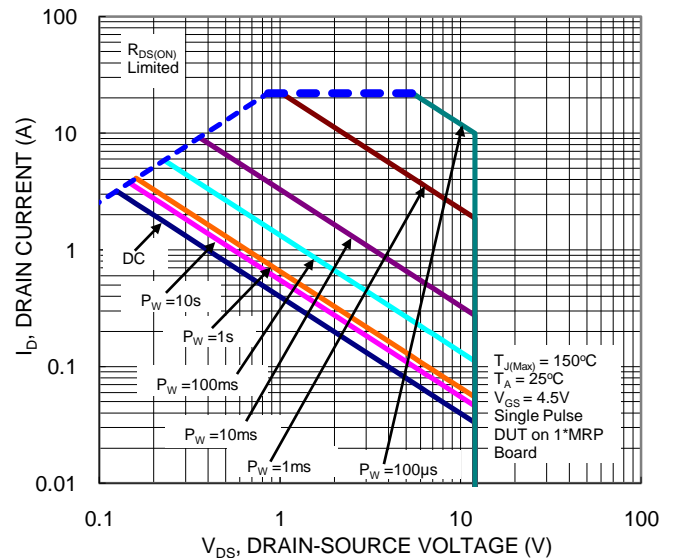
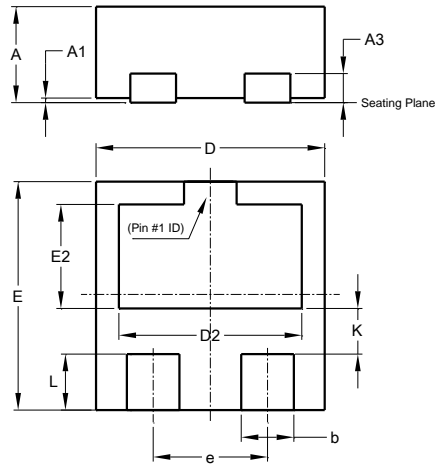


Figure 12 SOA, Safe Operation Area

## Package Outline Dimensions

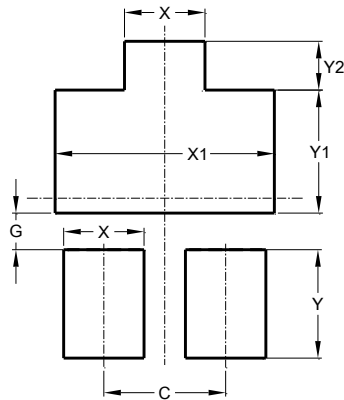
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



X2-DFN1010-3			
Dim	Min	Max	Typ
A	-	0.40	0.39
A1	0.00	0.05	0.02
A3	-	-	0.13
b	0.18	0.28	0.23
D	0.95	1.05	1.00
D2	0.70	0.90	0.80
E	0.95	1.05	1.00
E2	0.36	0.56	0.46
e	-	-	0.50
K	-	-	0.20
L	0.195	0.295	0.245
All Dimensions in mm			

## Suggested Pad Layout

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



X2-DFN1010-3	
Dimensions	Value
C	0.500
G	0.150
X	0.330
X1	0.900
Y	0.445
Y1	0.505
Y2	0.200
All Dimensions in mm	

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