

Dual N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON) \max}$	$I_D \max$ $T_A = +25^\circ C$
20V	11.5m Ω @ $V_{GS} = 4.5V$	10 A
	14m Ω @ $V_{GS} = 2.5V$	9 A

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

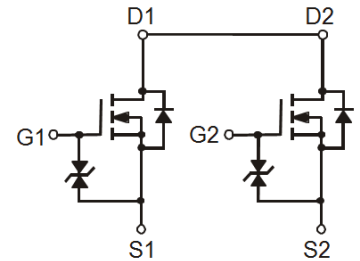
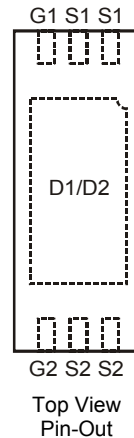
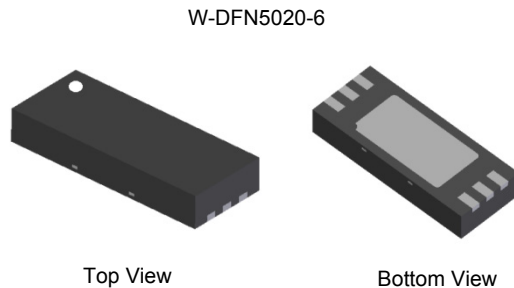
- General Purpose Interfacing Switch
- Power Management Functions

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected**
- **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: W-DFN5020-6
- 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 Below
- Weight: 0.03 grams (approximate)

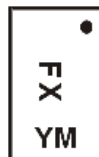


Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2013UFX-7	W-DFN5020-6	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/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



FX = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: X = 2010)
 M = Month (ex: 9 = September)

Date Code Key

Year	2010	2011	2012	2013	2014	2015	2016
Code	X	Y	Z	A	B	C	D

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	± 8	V
Continuous Drain Current (Note 5) $V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	10 8	A
Continuous Drain Current (Note 5) $V_{GS} = 2.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	9 7	A
Pulsed Drain Current (Note 7)			I_{DM}	80	A

Thermal Characteristics

Characteristic	Symbol	Max	Unit
Power Dissipation (Note 5)	P_D	0.78	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 5)	$R_{\theta JA}$	163	$^\circ\text{C/W}$
Power Dissipation (Note 6)	P_D	2.14	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 6)	$R_{\theta JA}$	59	$^\circ\text{C/W}$
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	
OFF CHARACTERISTICS (Note 8)							
Drain-Source Breakdown Voltage	BV_{DSS}	20	—	—	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}	—	—	1	μA	$V_{DS} = 16\text{V}, V_{GS} = 0\text{V}$	
Gate-Source Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 8\text{V}, V_{DS} = 0\text{V}$	
ON CHARACTERISTICS (Note 8)							
Gate Threshold Voltage	$V_{GS(th)}$	0.5	—	1.1	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	8.4	11.5	m Ω	$V_{GS} = 4.5\text{V}, I_D = 8.5\text{A}$	
			8.5	12.0			$V_{GS} = 4.0\text{V}, I_D = 8.5\text{A}$
			8.6	12.5			$V_{GS} = 3.5\text{V}, I_D = 8.5\text{A}$
			9.0	13.5			$V_{GS} = 3.1\text{V}, I_D = 8\text{A}$
			9.6	14.0			$V_{GS} = 2.5\text{V}, I_D = 8\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	—	18.2	—	S	$V_{DS} = 5\text{V}, I_D = 4\text{A}$	
Diode Forward Voltage	V_{SD}	—	—	1.2	V	$V_{GS} = 0\text{V}, I_S = 8.5\text{A}$	
DYNAMIC CHARACTERISTICS (Note 9)							
Input Capacitance	C_{iss}	—	2607	—	pF	$V_{DS} = 10\text{V}, V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$	
Output Capacitance	C_{oss}	—	255	—	pF		
Reverse Transfer Capacitance	C_{rss}	—	236	—	pF		
Gate Resistance	R_g	—	1.2	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	
Total Gate Charge ($V_{GS} = 4.5\text{V}$)	Q_g	—	32.4	—	nC	$V_{DS} = 10\text{V}, I_D = 8.5\text{A}$	
Total Gate Charge ($V_{GS} = 8\text{V}$)	Q_g	—	57.4	—	nC		
Gate-Source Charge	Q_{gs}	—	3.5	—	nC		
Gate-Drain Charge	Q_{gd}	—	4.0	—	nC		
Turn-On Delay Time	$t_{D(on)}$	—	8.6	—	ns		
Turn-On Rise Time	t_r	—	20.3	—	ns	$V_{DS} = 10\text{V}, I_D = 8.5\text{A}$ $V_{GS} = 4.5\text{V}, R_G = 1.8\Omega$	
Turn-Off Delay Time	$t_{D(off)}$	—	42.5	—	ns		
Turn-Off Fall Time	t_f	—	13.7	—	ns		

- Notes:
- Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate
 - Repetitive rating, pulse width limited by junction temperature.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

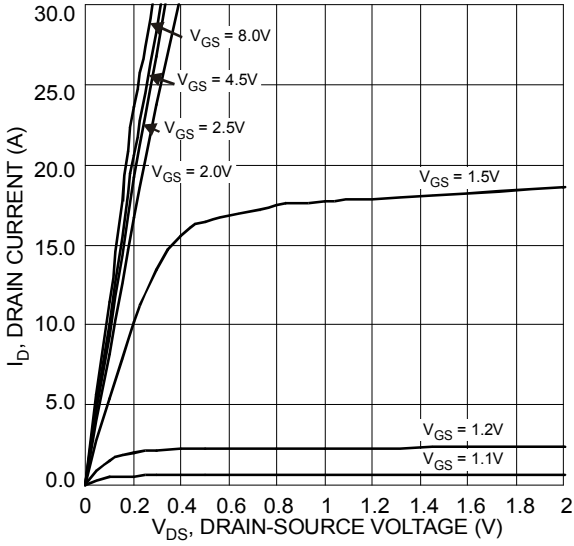


Figure 1 Typical Output Characteristic

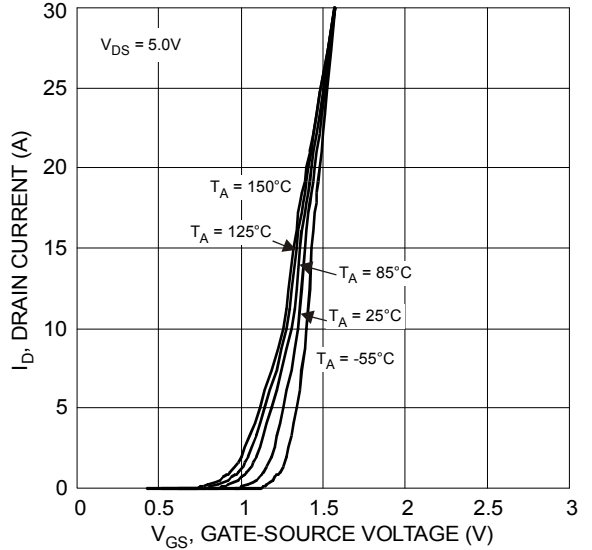


Figure 2 Typical Transfer Characteristics

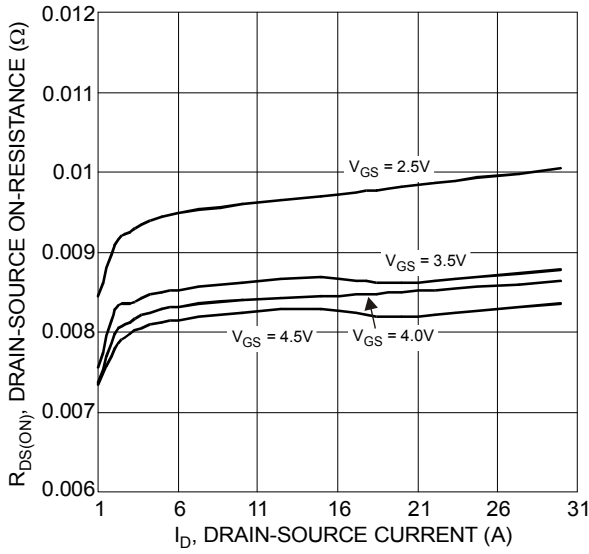


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

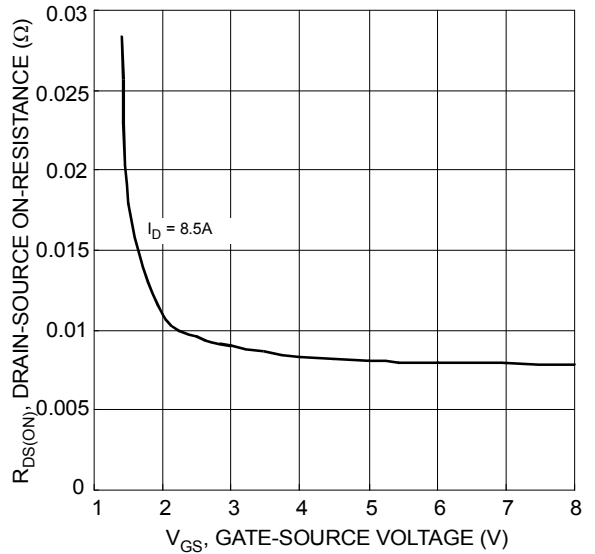


Figure 4 Typical Transfer Characteristic

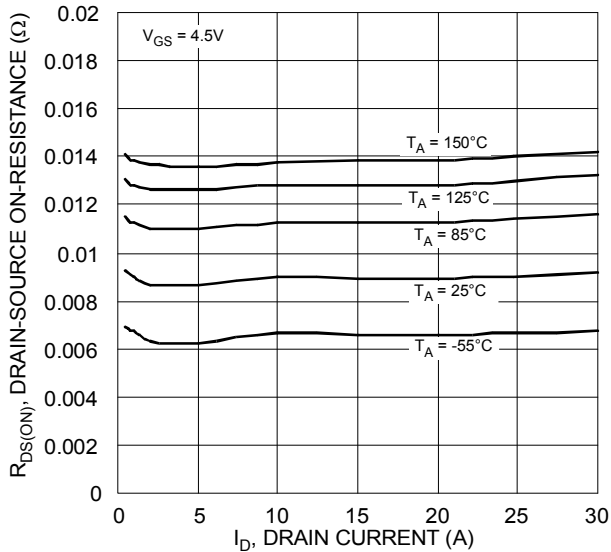


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

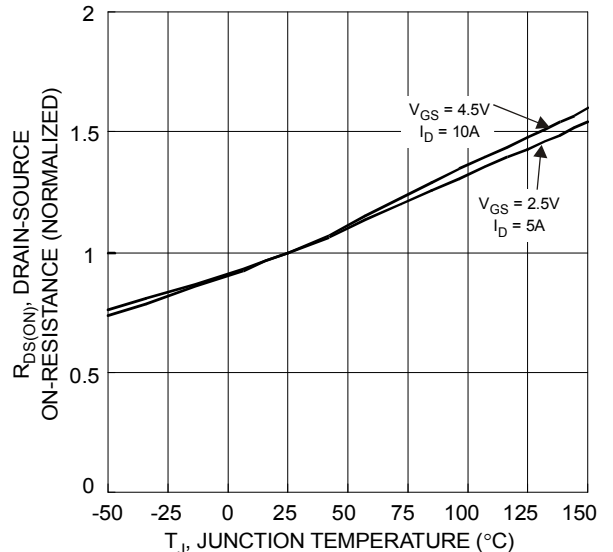


Figure 6 On-Resistance Variation with Temperature

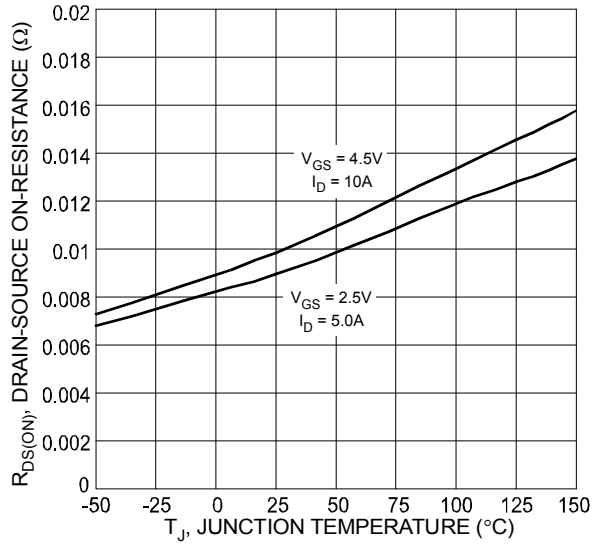


Figure 7 On-Resistance Variation with Temperature

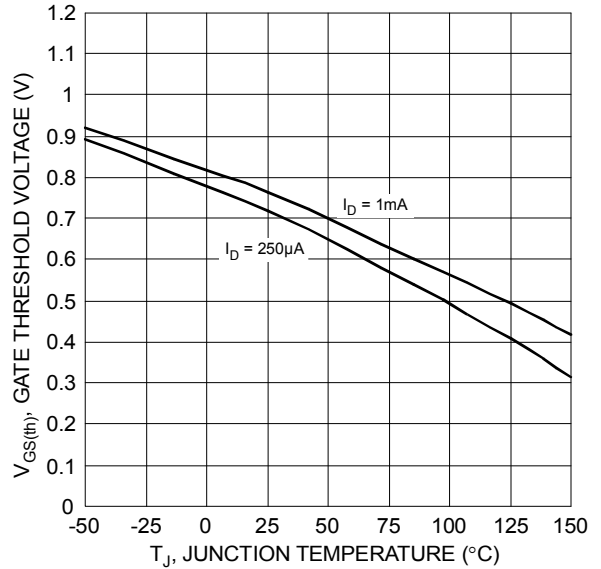


Figure 8 Gate Threshold Variation vs. Ambient Temperature

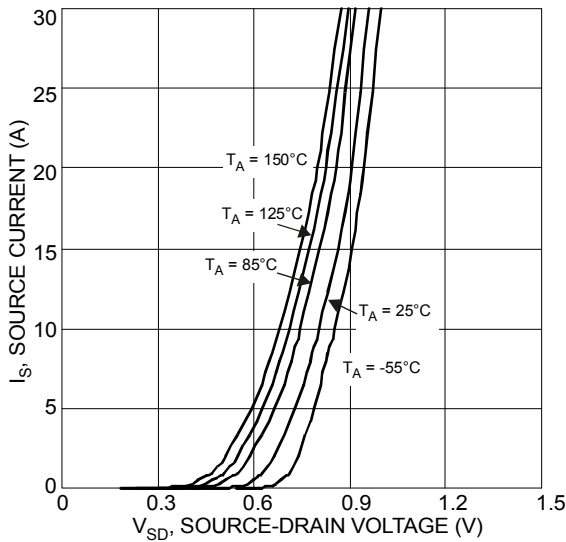


Figure 9 Diode Forward Voltage vs. Current

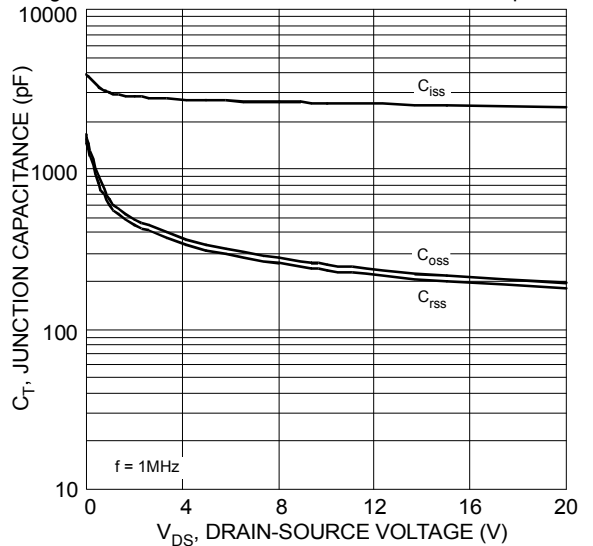


Figure 10 Typical Junction Capacitance

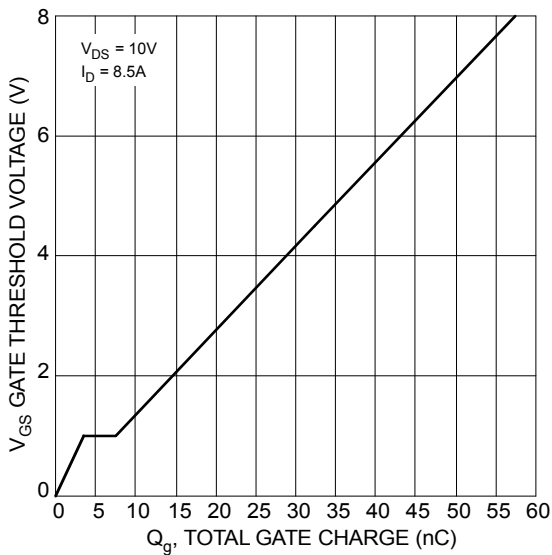
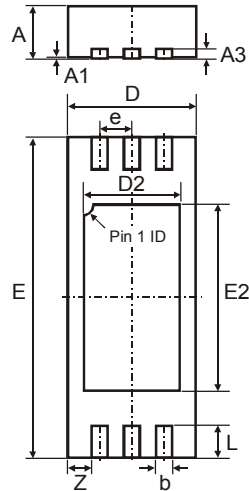


Figure 11 Gate Charge

Package Outline Dimensions

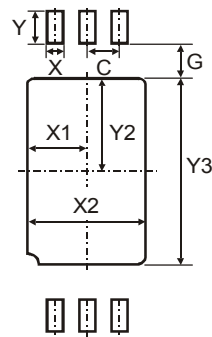
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



W-DFN5020-6			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0	0.05	0.02
A3	-	-	0.15
b	0.20	0.30	0.25
D	1.90	2.10	2.00
D2	1.40	1.60	1.50
e	-	-	0.50
E	4.90	5.10	5.00
E2	2.80	3.00	2.90
L	0.35	0.65	0.50
Z	-	-	0.375
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	0.50
G	0.35
X	0.35
X1	0.90
X2	1.80
Y	0.70
Y2	1.60
Y3	3.20

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