



20V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

V _{(BR)DSS}	R _{DS(ON)} max	I _D max T _A = +25°C
	22mΩ @ V _{GS} = 4.5V	7.9A
20V	26mΩ @ V _{GS} = 2.5V	7.2A
	36mΩ @ V _{GS} = 1.8V	6.1A
	50mΩ @ V _{GS} = 1.5V	5.2A

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

- Battery Management Application
- Power Management Functions
- DC-DC Converters

Features

- 0.6mm profile ideal for low profile applications
- PCB footprint of 4mm²
- Low Gate Threshold Voltage
- Fast Switching Speed
- 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

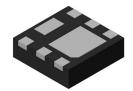
Mechanical Data

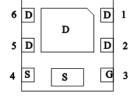
- Case: U-DFN2020-6 TYPE F
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.0065 grams (approximate)

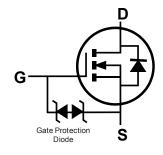
U-DFN2020-6 TYPE F











Top View

Bottom View

Pin Out Bottom View

Internal Schematic

Ordering Information (Note 4)

Part Number	Marking	Reel size (inches)	Quantity per reel
DMN2022UFDF-7	NC NC	7	3,000
DMN2022UFDF-13	NC	13	10,000

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



NC = Product Type Marking Code YM = Date Code Marking Y = Year (ex: A = 2013) M = Month (ex: 9 = September)

Date Code Key

Year	201	1	2012		2013	20	14	2015		2016	2	2017
Code	Y		Z		Α	[3	С		D		Е
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	0	N	D



Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units		
Drain-Source Voltage	V_{DSS}	20	V		
Gate-Source Voltage	V _{GSS}	±8	V		
Continuous Drain Current (Note CVV - 4 EV	Steady State	T _A = +25°C T _A = +70°C	ID	7.9 6.3	А
Continuous Drain Current (Note 6) V _{GS} = 4.5V	t<5s	T _A = +25°C T _A = +70°C	I _D	9.4 7.5	А
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	I _{DM}	40	Α		
Continuous Source-Drain Diode Current	T _A = +25°C	I _S	2	Α	
Avalanche Current (Note 7) L = 0.1mH	I _{AS}	12	Α		
Avalanche Energy (Note 7) L = 0.1mH	E _{AS}	8	mJ		

Thermal Characteristics

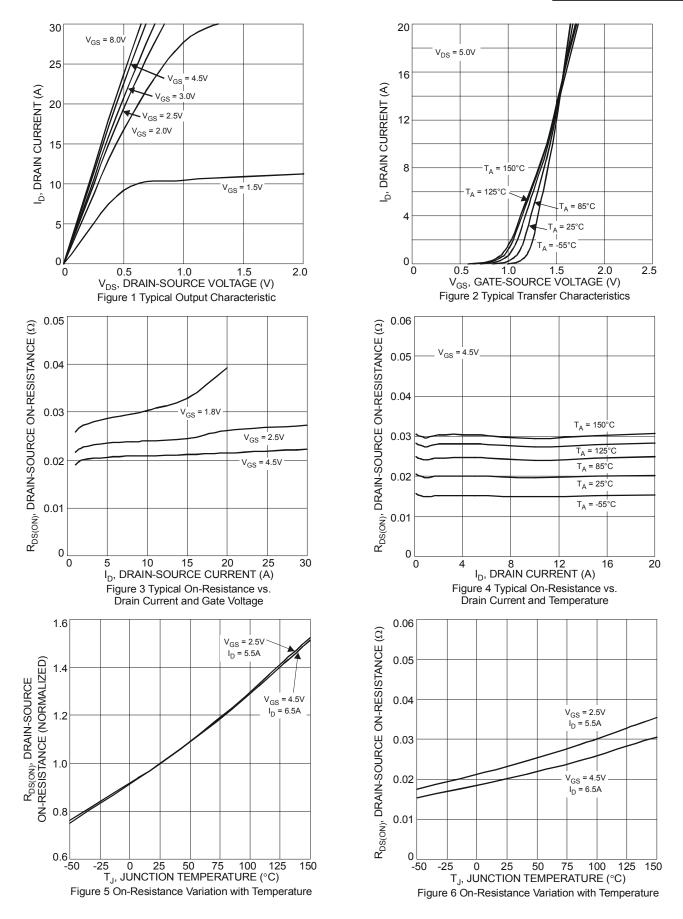
Characteristic	Symbol	Value	Units		
Total Bower Discination (Note 5)	T _A = +25°C	C	0.66	W	
Total Power Dissipation (Note 5)	T _A = +70°C	P_{D}	0.42	VV	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	D	188	°C/W	
Thermal Resistance, Junction to Ambient (Note 5)	t<5s	$R_{\theta JA}$	135	C/VV	
Total Power Dissipation (Note 6)	T _A = +25°C	Б	2.03	W	
Total Power Dissipation (Note 6)	T _A = +70°C	P_{D}	1.31		
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	D	60	°C/W	
memai Resistance, Junction to Ambient (Note 6)	t<5s	$R_{\theta JA}$	43		
Thermal Resistance, Junction to Case (Note 6)	Steady state	$R_{ heta JC}$	8.3		
Operating and Storage Temperature Range		T_{J} , T_{STG}	-55 to +150	°C	

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition		
OFF CHARACTERISTICS (Note 8)								
Drain-Source Breakdown Voltage	BV _{DSS}	20		_	V	$V_{GS} = 0V, I_D = 250\mu A$		
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}		I	1	μΑ	$V_{DS} = 20V, V_{GS} = 0V$		
Gate-Source Leakage	I _{GSS}		l	±10	μΑ	$V_{GS} = \pm 8V, V_{DS} = 0V$		
ON CHARACTERISTICS (Note 8)	ON CHARACTERISTICS (Note 8)							
Gate Threshold Voltage	V _{GS(th)}	0.5	_	1.0	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$		
			15	22		$V_{GS} = 4.5V, I_D = 4A$		
Static Drain-Source On-Resistance	Dec (a)		18	26	mΩ	$V_{GS} = 2.5V, I_D = 4A$		
Static Drain-Source On-Resistance	R _{DS} (ON)	_	24	36	11177	$V_{GS} = 1.8V, I_D = 4A$		
			35	50		$V_{GS} = 1.5V, I_D = 4A$		
Forward Transfer Admittance	Y _{fs}	_	18	_	S	$V_{DS} = 5V, I_{D} = 12A$		
Diode Forward Voltage	V_{SD}	_	0.7	1.0	V	$V_{GS} = 0V$, $I_S = 5A$		
DYNAMIC CHARACTERISTICS (Note 9)								
Input Capacitance	C _{iss}	_	907	_	pF			
Output Capacitance	Coss	_	98	_		$V_{DS} = 10V, V_{GS} = 0V,$ f = 1.0MHz		
Reverse Transfer Capacitance	C _{rss}		38	_		1 - 1.000112		
Gate Resistance	R_g	_	194	_	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz		
Total Gate Charge (V _{GS} = 4.5V)	Qg		9.8	_				
Total Gate Charge (V _{GS} = 8V)	Qg	_	18	_	nC	V _{DS} = 10V. I _D = 6.5A		
Gate-Source Charge	Q_{gs}	_	1.5	_	IIC	V _{DS} = 10V, I _D = 6.5A		
Gate-Drain Charge	Q_{gd}	_	1.8	_				
Turn-On Delay Time	t _{D(on)}	_	56	_				
Turn-On Rise Time	t _r	_	87	_		$V_{DS} = 10V, V_{GS} = 4.5V,$		
Turn-Off Delay Time	t _{D(off)}	- 632 - ns R _G =		$R_G = 6\Omega$, $R_L = 10\Omega$, $I_D = 1A$				
Turn-Off Fall Time	t _f	_	239	_				
Reverse Recovery Time	t _{rr}	_	143	_	ns	I _F = 4A, di/dt = 100A/μs		
Reverse Recovery Charge	Q _{rr}		136	_	nC	I _F = 4A, di/dt = 100A/μs		

5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.









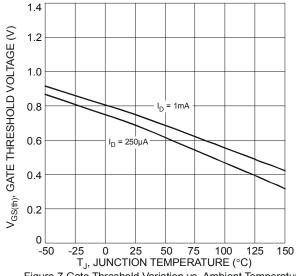
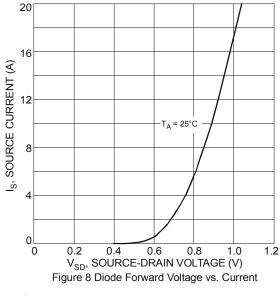
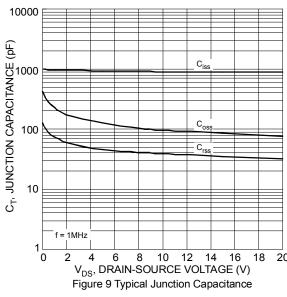
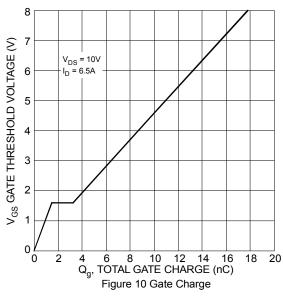
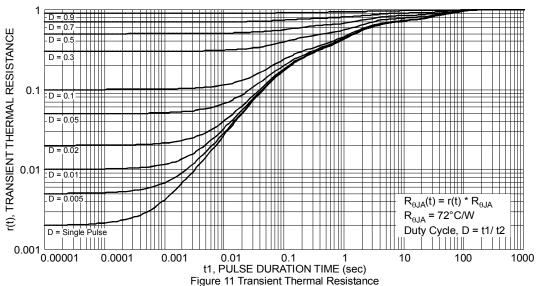


Figure 7 Gate Threshold Variation vs. Ambient Temperature





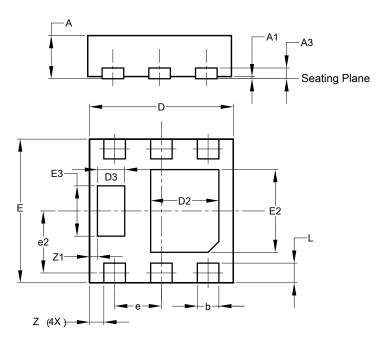






Package Outline Dimensions

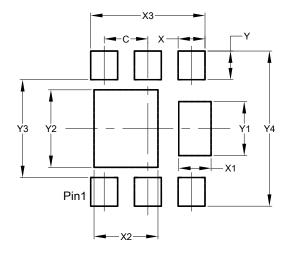
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



U-DFN2020-6							
Dim	Min	Тур					
Α	0.57	0.63	0.60				
A1	0 0.05		0.03				
A3	-	1	0.15				
b	0.25	0.35	0.30				
D	1.95	2.05	2.00				
D2	0.85	1.05	0.95				
D3	0.33	0.43	0.38				
e		0.65 BSC					
e2	C).863 B	SC				
Е	1.95	2.05	2.00				
E2	1.05	1.25	1.15				
E3	0.65	0.75	0.70				
١	0.225	0.325	0.275				
Z	0.20 BSC						
Z 1	0.110 BSC						
All	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)
С	0.650
Х	0.400
X1	0.480
X2	0.950
Х3	1.700
Υ	0.425
Y1	0.800
Y2	1.150
Y3	1.450
Y4	2.300



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