

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max $T_A = +25^\circ\text{C}$
20V	22m Ω @ $V_{GS} = 4.5\text{V}$	7.9A
	26m Ω @ $V_{GS} = 2.5\text{V}$	7.2A
	36m Ω @ $V_{GS} = 1.8\text{V}$	6.1A
	50m Ω @ $V_{GS} = 1.5\text{V}$	5.2A

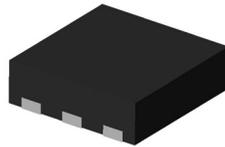
Description

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.

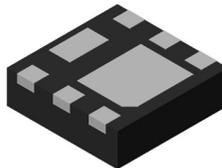
Applications

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

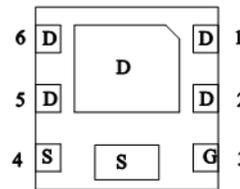
U-DFN2020-6
TYPE F



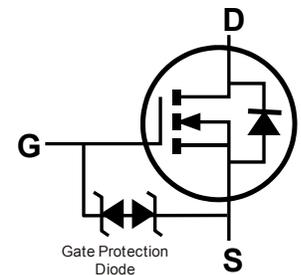
Top View



Bottom View



Pin Out
Bottom View



Internal Schematic

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)

Ordering Information (Note 4)

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

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 - 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.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - 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	2011	2012	2013	2014	2015	2016	2017
Code	Y	Z	A	B	C	D	E

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°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 6) V _{GS} = 4.5V	Steady State	T _A = +25°C T _A = +70°C	I _D	7.9 6.3	A
	t < 5s	T _A = +25°C T _A = +70°C	I _D	9.4 7.5	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I _{DM}	40	A
Continuous Source-Drain Diode Current		T _A = +25°C	I _S	2	A
Avalanche Current (Note 7) L = 0.1mH			I _{AS}	12	A
Avalanche Energy (Note 7) L = 0.1mH			E _{AS}	8	mJ

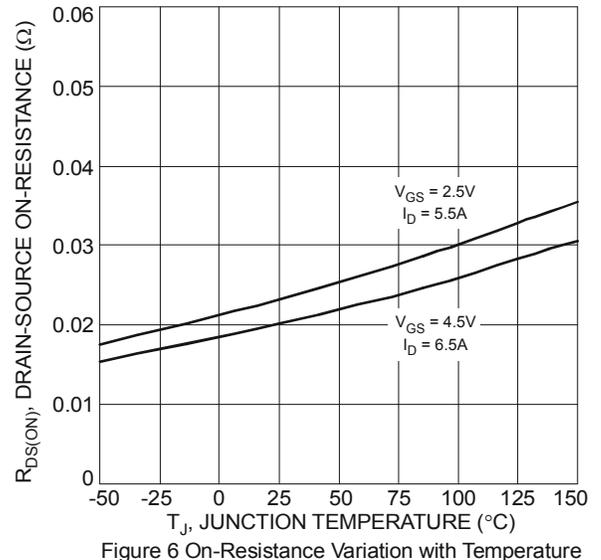
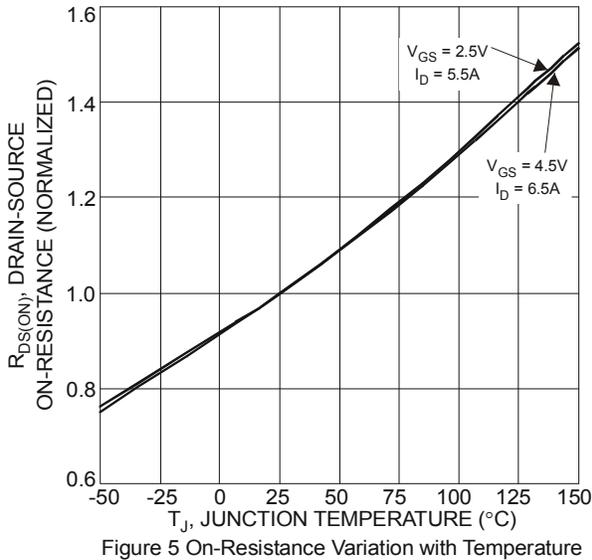
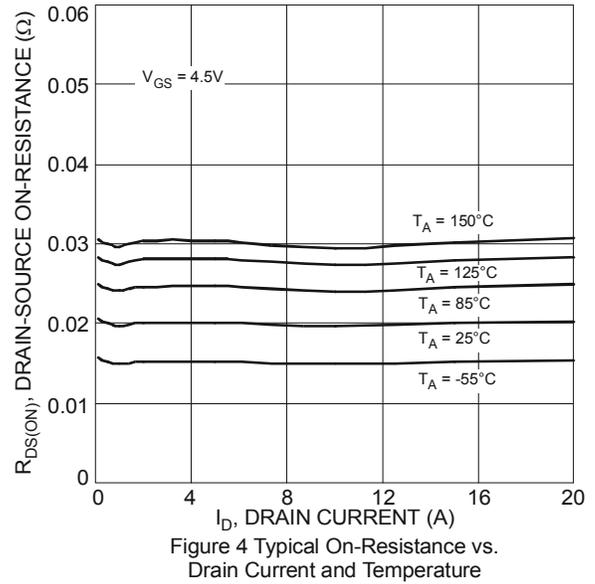
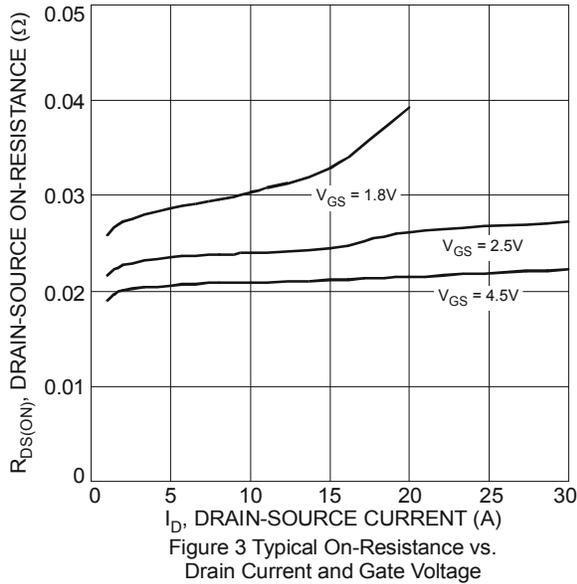
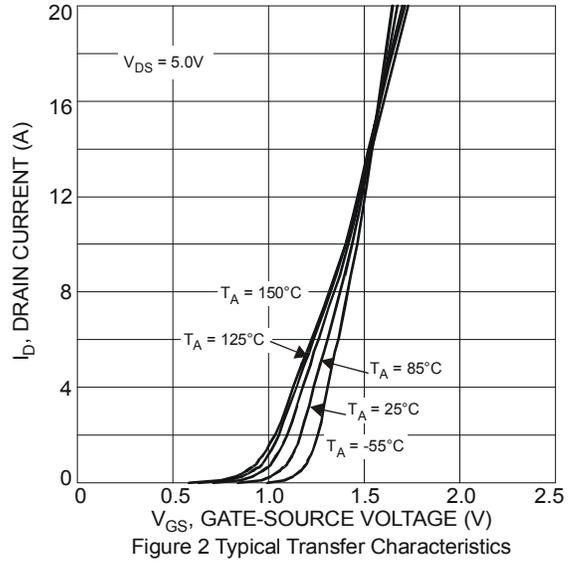
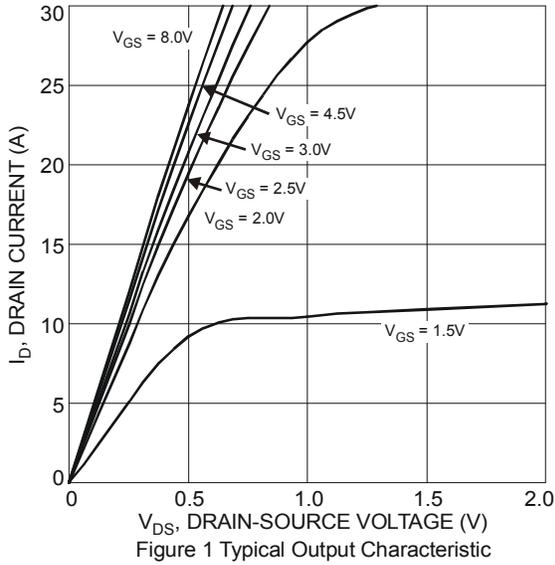
Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	0.66	W
	T _A = +70°C		0.42	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	R _{θJA}	188	°C/W
	t < 5s		135	
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	2.03	W
	T _A = +70°C		1.31	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	R _{θJA}	60	°C/W
	t < 5s		43	
Thermal Resistance, Junction to Case (Note 6)	Steady state	R _{θJC}	8.3	°C
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	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV _{DSS}	20	—	—	V	V _{GS} = 0V, I _D = 250µA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	1	µA	V _{DS} = 20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	µA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(th)}	0.5	—	1.0	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DS(on)}	—	15	22	mΩ	V _{GS} = 4.5V, I _D = 4A
			18	26		V _{GS} = 2.5V, I _D = 4A
			24	36		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	V _{DS} = 10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	98	—		
Reverse Transfer Capacitance	C _{rss}	—	38	—		
Gate Resistance	R _g	—	194	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	9.8	—	nC	V _{DS} = 10V, I _D = 6.5A
Total Gate Charge (V _{GS} = 8V)	Q _g	—	18	—		
Gate-Source Charge	Q _{gs}	—	1.5	—		
Gate-Drain Charge	Q _{gd}	—	1.8	—		
Turn-On Delay Time	t _{D(on)}	—	56	—	ns	V _{DS} = 10V, V _{GS} = 4.5V, R _G = 6Ω, R _L = 10Ω, I _D = 1A
Turn-On Rise Time	t _r	—	87	—		
Turn-Off Delay Time	t _{D(off)}	—	632	—		
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

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



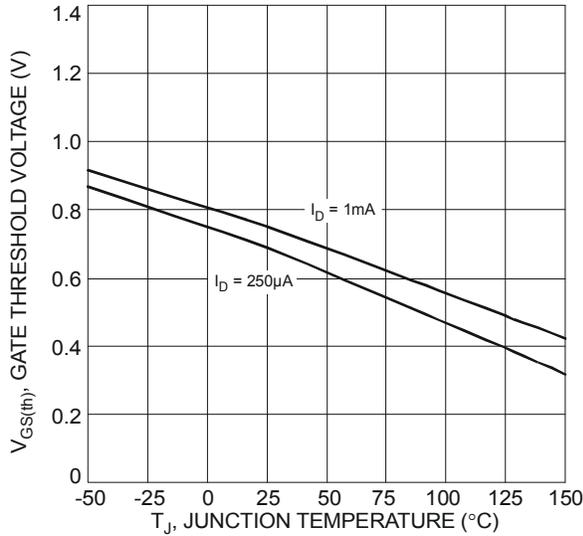


Figure 7 Gate Threshold Variation vs. Ambient Temperature

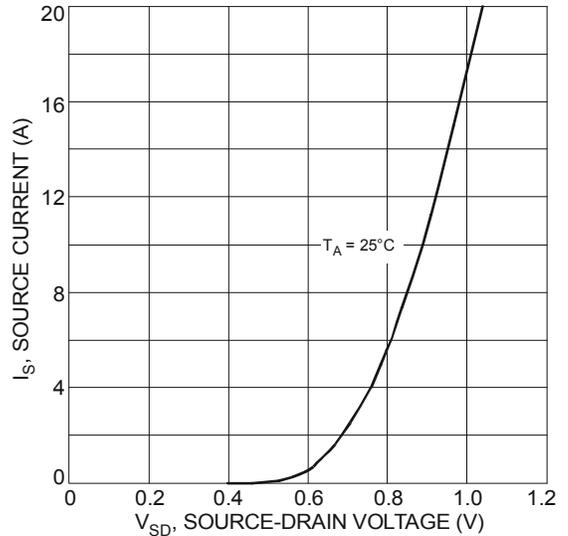


Figure 8 Diode Forward Voltage vs. Current

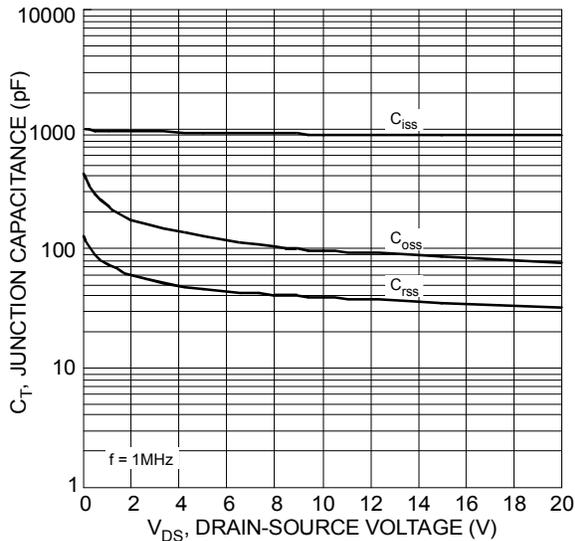


Figure 9 Typical Junction Capacitance

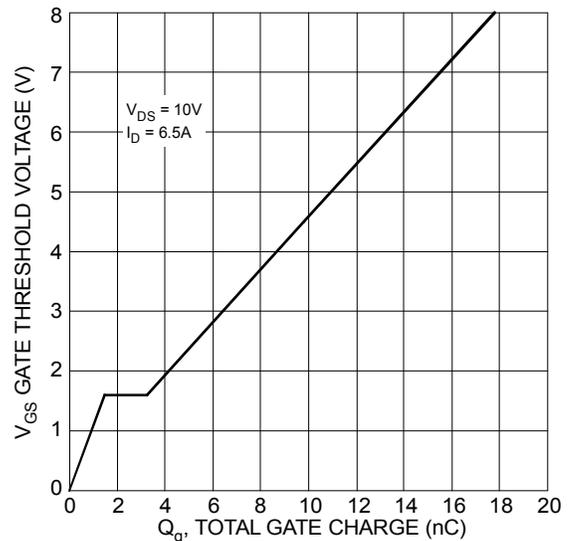


Figure 10 Gate Charge

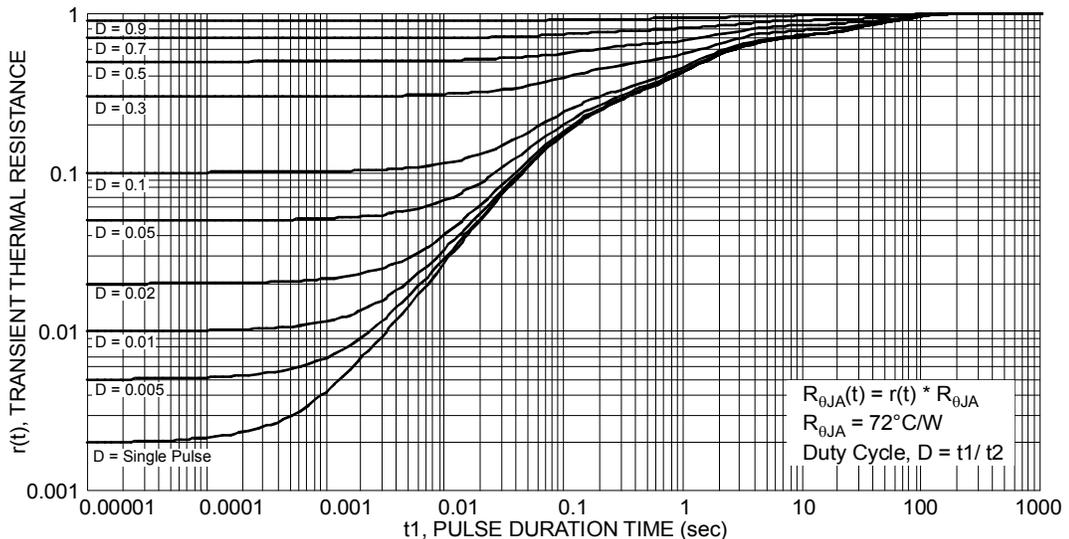


Figure 11 Transient Thermal Resistance

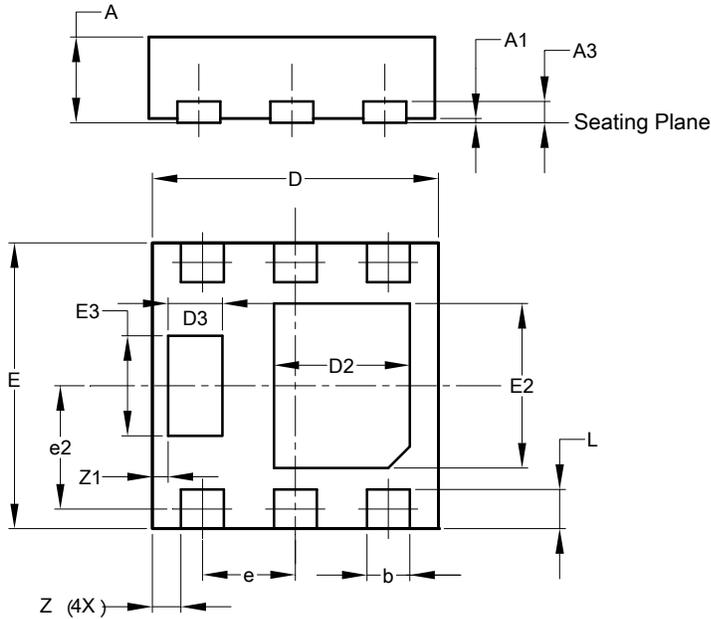
$$R_{\theta JA}(t) = r(t) * R_{\theta JA}$$

$$R_{\theta JA} = 72^{\circ}\text{C/W}$$

$$\text{Duty Cycle, } D = t1 / t2$$

Package Outline Dimensions

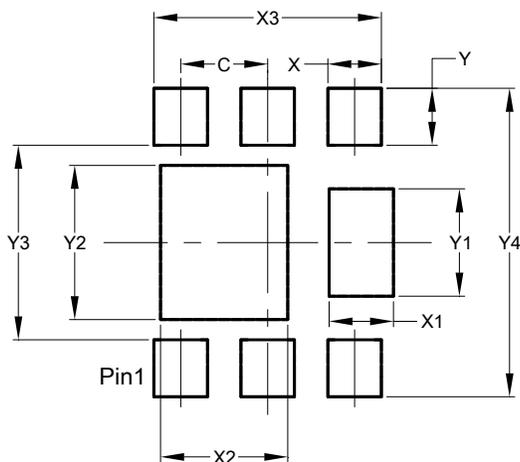
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



U-DFN2020-6			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0	0.05	0.03
A3	-	-	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	0.863 BSC		
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
E3	0.65	0.75	0.70
L	0.225	0.325	0.275
Z	0.20 BSC		
Z1	0.110 BSC		
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	0.650
X	0.400
X1	0.480
X2	0.950
X3	1.700
Y	0.425
Y1	0.800
Y2	1.150
Y3	1.450
Y4	2.300

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