

#### P-CHANNEL ENHANCEMENT MODE MOSFET

## **Product Summary**

V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>A</sub> = +25 ℃			
-20V	$16m\Omega @ V_{GS} = -4.5V$	-9.0A			
-20V	22mΩ @ V <sub>GS</sub> = -2.5V	-7.7A			

#### **Features and Benefits**

- 0.6mm Profile Ideal for Low Profile Applications
- PCB Footprint of 4mm<sup>2</sup>
- Low Gate Threshold Voltage
- Low On-Resistance
- 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

## **Description and Applications**

This MOSFET is designed to minimize on-state resistance  $(R_{DS(ON)})$  and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

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

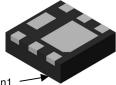
## **Mechanical Data**

- Case: U-DFN2020-6
- 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 @4
- Weight: 0.007 grams (Approximate)



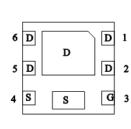




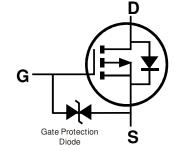


Top View

**Bottom View** 



Pin Out Bottom View



Equivalent Circuit

#### Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2021UFDF-7	U-DFN2020-6	3,000/Tape & Reel
DMP2021UFDF-13	U-DFN2020-6	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 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**

U-DFN2020-6



P1 = Product Type Marking Code YM = Date Code Marking Y = Year (ex: C = 2015) M = Month (ex: 9 = September)

Date Code Key

<u> </u>	to occorrioy												
	Year	201	4	2015		2016	20	17	2018		2019	2	2020
	Code	В		С		D		Ε	F		G		Н
	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 <sub>GSS</sub>	±8	V		
Continuous Drain Current (Note 6) V <sub>GS</sub> = -4.5V	Steady State	T <sub>A</sub> = +25 °C T <sub>A</sub> = +70 °C	l <sub>D</sub>	-9.0 -7.2	А
Continuous Drain Current (Note 6) VGS = -4.5V	t<10s	$T_A = +25 ^{\circ}\text{C}$ $T_A = +70 ^{\circ}\text{C}$	l <sub>D</sub>	-11.1 -8.9	Α
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	$I_{DM}$	-60	Α		
Continuous Source-Drain Diode Current (Note 6)	Is	-2.4	Α		
Avalanche Current (Note 7) L = 0.1mH	I <sub>AS</sub>	-27	Α		
Avalanche Energy (Note 7) L = 0.1mH	E <sub>AS</sub>	38	mJ		

## Thermal Characteristics (@ $T_A = +25$ °C, unless otherwise specified.)

Characteristic		Symbol	Value	Units	
Total Bower Dissipation (Note 5)	T <sub>A</sub> = +25 ℃	В	0.73	W	
Total Power Dissipation (Note 5)	T <sub>A</sub> = +70 °C	$P_{D}$	0.47		
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	П	172	0C AM	
Thermal nesistance, bunction to Ambient (Note 5)	t<10s	$R_{\theta JA}$	121	°C/W	
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25 ℃	Pn	2.02	W	
Total Fower Dissipation (Note 6)	T <sub>A</sub> = +70 °C	PD	1.30		
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	П	63	°C/W	
Thermal nesistance, bunction to Ambient (Note 6)	t<10s	$R_{\theta JA}$	42		
Thermal Resistance, Junction to Case (Note 6)	$R_{ heta JC}$	18			
Operating and Storage Temperature Range		$T_{J_i}T_{STG}$	-55 to +150	°C	

## Electrical Characteristics (@T<sub>A</sub> = +25 °C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition			
OFF CHARACTERISTICS (Note 8)									
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	_	_	V	$V_{GS} = 0V, I_D = -250\mu A$			
Zero Gate Voltage Drain Current T <sub>J</sub> = +25 °C	I <sub>DSS</sub>	_	_	-1	μΑ	$V_{DS} = -20V, V_{GS} = 0V$			
Gate-Source Leakage	IGSS	_	_	±10	μΑ	$V_{GS} = \pm 8V$ , $V_{DS} = 0V$			
ON CHARACTERISTICS (Note 8)	ON CHARACTERISTICS (Note 8)								
Gate Threshold Voltage	$V_{GS(th)}$	-0.35	_	-1.0	V	$V_{DS} = V_{GS}$ , $I_D = -250\mu A$			
			12	16		$V_{GS} = -4.5V, I_D = -7.0A$			
Static Drain-Source On-Resistance	Dag (av)		15	22	mΩ	$V_{GS} = -2.5V, I_D = -5.0A$			
Static Diain-Source Off-nesistance	R <sub>DS</sub> (ON)		19	40	11122	$V_{GS} = -1.8V, I_D = -3.0A$			
			21	80		$V_{GS} = -1.5V, I_D = -1.0A$			
Diode Forward Voltage	$V_{SD}$	_	-0.8	-1.2	V	$V_{GS} = 0V, I_{S} = -1.0A$			
DYNAMIC CHARACTERISTICS (Note 9)									
Input Capacitance	C <sub>iss</sub>	_	2,760	_		V 45V V 0V			
Output Capacitance	Coss	_	262	_	pF	$V_{DS} = -15V, V_{GS} = 0V,$ f = 1.0MHz			
Reverse Transfer Capacitance	C <sub>rss</sub>	_	220	_		1 = 1:01VII 12			
Gate Resistance	$R_g$	_	16	30	Ω	$V_{DS} = 0V$ , $V_{GS} = 0V$ , $f = 1MHz$			
Total Gate Charge (V <sub>GS</sub> = -4.5V)	$Q_g$	_	34	_					
Total Gate Charge (V <sub>GS</sub> = -8V)	Qg	_	59	_	nC	Vns = -15V. In = -4.0A			
Gate-Source Charge	$Q_{gs}$	_	3.5	_	110	VDS = -15V, ID = -4.0A			
Gate-Drain Charge	$Q_{gd}$	_	8.3	_					
Turn-On Delay Time	t <sub>D(on)</sub>	_	7.5	_					
Turn-On Rise Time	t <sub>r</sub>	_	25	_	no	$V_{DS} = -15V, V_{GS} = -4.5V,$			
Turn-Off Delay Time	t <sub>D(off)</sub>		125		ns	$R_G = 1\Omega$ , $I_D = -4.0A$			
Turn-Off Fall Time	t <sub>f</sub>	_	96	_					
Reverse Recovery Time	t <sub>rr</sub>	_	48	_	ns	I <sub>F</sub> = -1.0A, di/dt = 100A/μs			
Reverse Recovery Charge	Q <sub>rr</sub>	_	33	_	nC	I <sub>F</sub> = -1.0A, di/dt = 100A/μs			

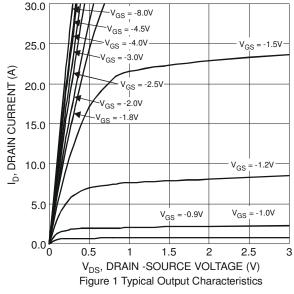
 Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate. Notes:

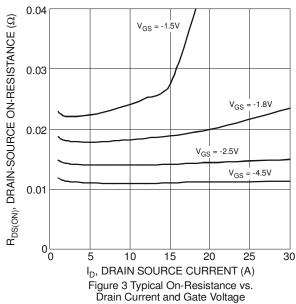
7.  $I_{AS}$  and  $E_{AS}$  rating are based on low frequency and duty cycles to keep  $T_J = +25$  °C.

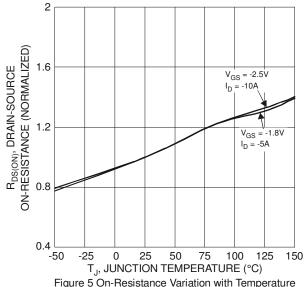
8. Short duration pulse test used to minimize self-heating effect.

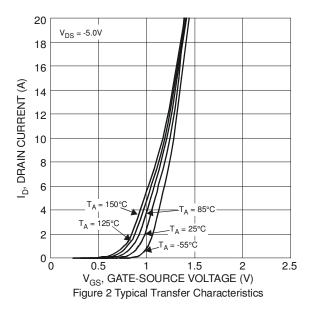
9. Guaranteed by design. Not subject to product testing.

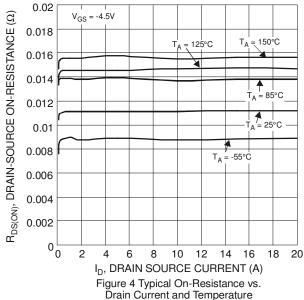












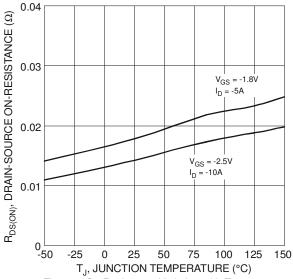


Figure 6 On-Resistance Variation with Temperature



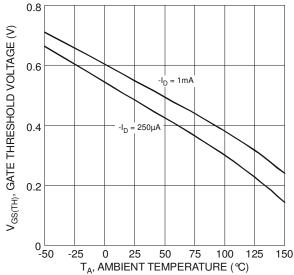
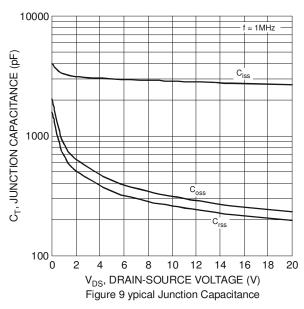
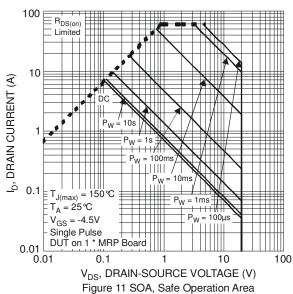
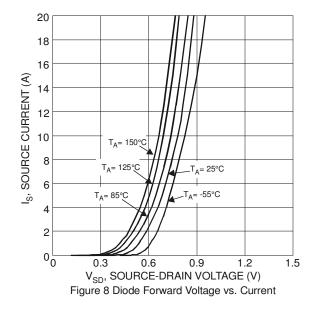
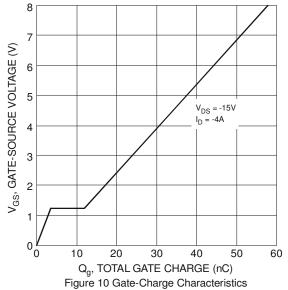


Figure 7 Gate Threshold Variation vs. Ambient Temperature

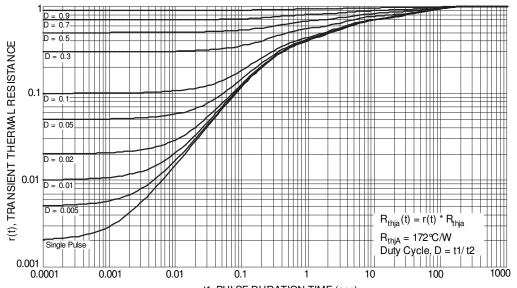










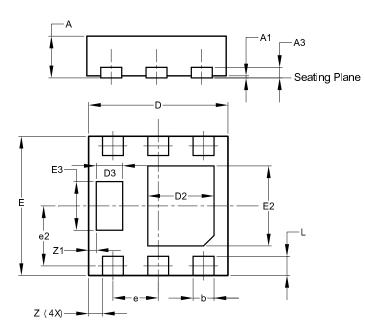


t1, PULSE DURATION TIME (sec) Figure 12 Transient Thermal Resistance



## **Package Outline Dimensions**

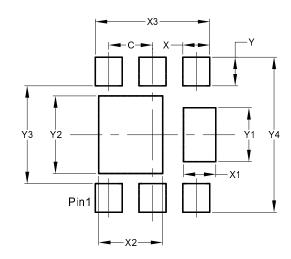
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



U-DFN2020-6								
(Type F)								
Dim	Min	Min Max Typ						
Α	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	0.85 1.05 0.95						
D3	0.33 0.43 0.38							
е		0.65 B	SC					
e2	(	).863 B	SC					
Е	1.95	2.05	2.00					
E2	1.05	1.25	1.15					
E3	0.65	0.65 0.75 0.70						
L	0.225 0.325 0.275							
Z	0.20 BSC							
<b>Z</b> 1	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)
С	0.650
X	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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многоканальный

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