

12V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
	15mΩ @ $V_{GS} = -4.5V$	-20A
-12V	20mΩ @ V _{GS} = -3.7V	-18A
	$30m\Omega$ @ $V_{GS} = -2.5V$	-16A
	40mΩ @ V _{GS} = -1.8V	-11A

Description

This new generation MOSFET is 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 On-Resistance
- Fast Switching Speed
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

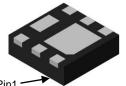
Mechanical Data

- 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 4
- Weight: 0.007 grams (Approximate)

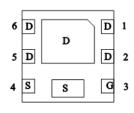
U-DFN2020-6 (Type F)



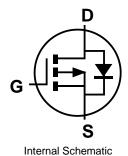
Top View



Bottom View



Pin Out Bottom View



Ordering Information (Note 4)

Part Number	Case	Packaging
DMP1012UFDF-7	U-DFN2020-6 (Type F)	3,000/Tape & Reel
DMP1012UFDF-13	U-DFN2020-6 (Type F)	10,000/Tape & Reel

Notes:

- 1. 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.
- 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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



PF = Product Type Marking Code YM = Date Code Marking Y = Year (ex: F = 2018) M = Month (ex: 9 = September)

Date Code Key

Year	2018		2019	2020		2021	2022		2023	2024		2025
Code	F		G	Н		I	J		K	L		M
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	Unit			
Drain-Source Voltage	V_{DSS}	-12	V			
Gate-Source Voltage	V_{GSS}	±8	V			
Continuous Drain Current V _{GS} = -4.5V (Note 10)	Steady State	$T_C = +25$ °C $T_C = +70$ °C	I _D	-20 -16	А	
	t<5s (Note 6)	$T_A = +25^{\circ}C$	I _D	-12.6	Α	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	-55	Α			
Maximum Body Diode Continuous Current (Note 6)	Is	-2.8	Α			
Avalanche Current (Note 7), L = 0.1mH	I _{AS}	-21	Α			
Avalanche Energy (Note 7,) L = 0.1mH	E _{AS}	22	mJ			

Thermal Characteristics

Characteristic	Symbol	Value	Unit		
Total Power Discipation (Note 5)	$T_A = +25^{\circ}C$	D	0.72	W	
Total Power Dissipation (Note 5)	$T_A = +70^{\circ}C$	P_{D}	0.46	VV	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	р	172	°C/W	
Thermal Resistance, Junction to Ambient (Note 3)	t<5s	$R_{\theta JA}$	130	C/VV	
Total Power Dissipation (Note 6)	$T_A = +25$ °C	P _D	2.11	W	
Total Power Dissipation (Note 6)	$T_A = +70^{\circ}C$	PD	1.36		
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	D	59	°C/W	
Thermal Resistance, Junction to Ambient (Note o)	t<5s	$R_{\theta JA}$	44		
Thermal Resistance, Junction to Case (Note 6)	Steady State	$R_{ heta JC}$	9.0		
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}	-12	_	_	V	$V_{GS} = 0V, I_D = -250\mu A$	
Zero Gate Voltage Drain Current	I _{DSS}	_	_	-1	μA	$V_{DS} = -10V, V_{GS} = 0V$	
Gate-Source Leakage	I _{GSS}	_	_	±100	nA	$V_{GS} = \pm 8V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 8)							
Gate Threshold Voltage	V _{GS(TH)}	-0.3	-0.5	-0.9	V	$V_{DS} = V_{GS}$, $I_D = -250\mu A$	
			11	15		$V_{GS} = -4.5V$, $I_D = -5A$	
Static Drain-Source On-Resistance	Dec. (a)		12	20	mΩ	$V_{GS} = -3.7V$, $I_{D} = -5A$	
Static Dialif-Source Off-Resistance	R _{DS(ON)}		15	30	11122	$V_{GS} = -2.5V$, $I_D = -4A$	
			20	40		$V_{GS} = -1.8V, I_{D} = -1A$	
Diode Forward Voltage	V_{SD}	_	-0.8	-1.2	V	$V_{GS} = 0V, I_{S} = -10A$	
DYNAMIC CHARACTERISTICS (Note 9)						_	
Input Capacitance	C _{iss}	_	1344	_		VDS = -10V, VGS = 0V,	
Output Capacitance	Coss	_	342	_	pF	f = 1.0MHz	
Reverse Transfer Capacitance	Crss	_	297	_		1 - 1.01/11/2	
Gate Resistance	R_{g}	_	15	_	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$	
Total Gate Charge (V _{GS} = -4.5V)	Qg	_	19.5	_			
Total Gate Charge (V _{GS} = -8V)	Qg	_	31	_	nC	V _{DS} = -6V. I _D = -10A	
Gate-Source Charge	Q _{gs}	_	2.1	_	IIC	V _{DS} = -6V, I _D = -10A	
Gate-Drain Charge	Q_{gd}	_	7.9	_			
Turn-On Delay Time	t _{D(ON)}	_	6.0	_			
Turn-On Rise Time	t _R	_	32	_		$V_{DS} = -6V, V_{GS} = -4.5V,$	
Turn-Off Delay Time	t _{D(OFF)}	_	71	_	ns	$R_g = 1\Omega$, $I_D = -8A$	
Turn-Off Fall Time	t _F	_	85	_			
Reverse Recovery Time	t _{RR}	_	46	_	ns	1 404 11/14 5004/	
Reverse Recovery Charge	Q _{RR}		44	_	nC	I _F = -12A, di/dt = 500A/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.

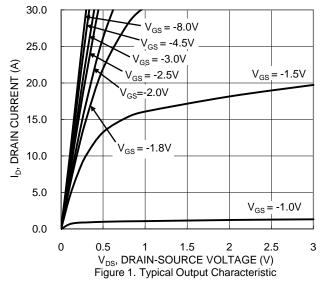
7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.

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

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

10. Package limited. Notes:





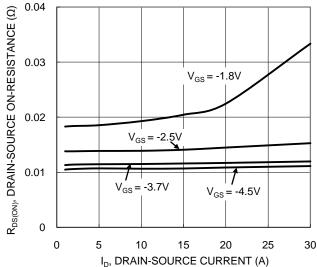


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

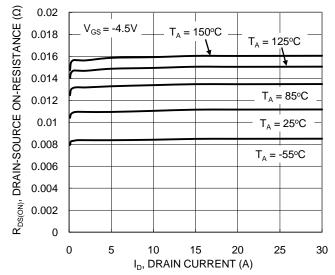


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

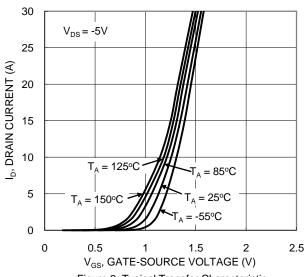


Figure 2. Typical Transfer Characteristic

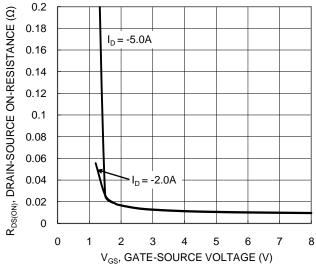


Figure 4. Typical Transfer Characteristic

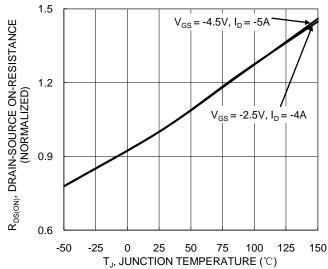
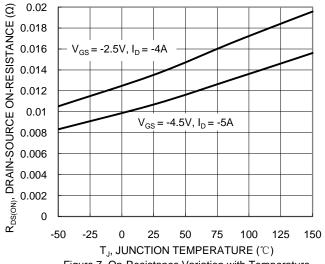
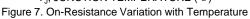
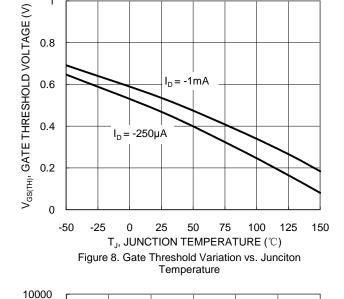


Figure 6. On-Resistance Variation with Temperature









 \mathbf{C}_{iss}

Coss

 $\mathsf{C}_{\mathsf{rss}}$

6

V_{DS}, DRAIN-SOURCE VOLTAGE (V)

8

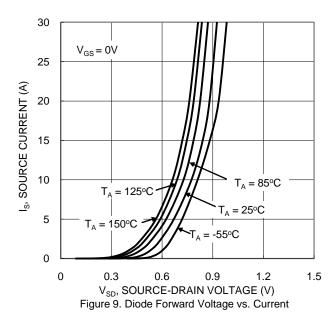
f=1MHz

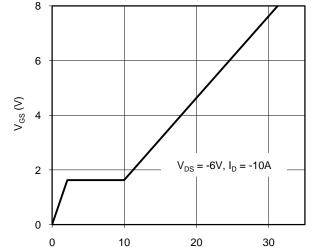
C_T, JUNCTION CAPACITANCE (pF)

1000

100

0





 Q_{α} (nC) Figure 11. Gate Charge

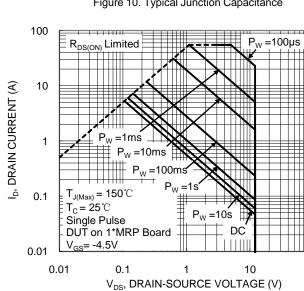


Figure 12. SOA, Safe Operation Area

10

12



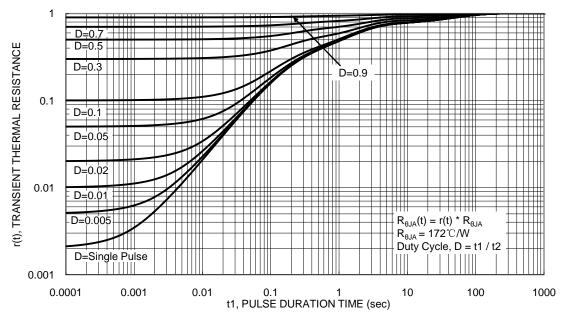


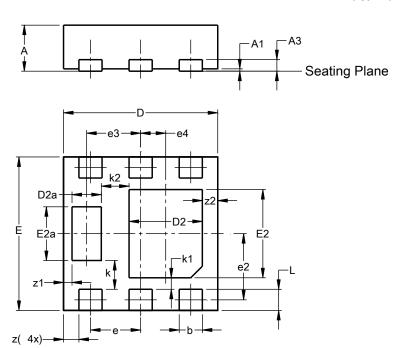
Figure 13. Transient Thermal Resistance



Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

U-DFN2020-6 (Type F)

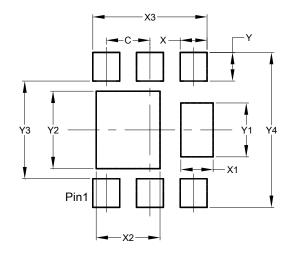


U-DFN2020-6							
(Type F)							
Dim	Min	Min Max Typ					
Α	0.57	0.63	0.60				
A 1	0.00	0.05	0.03				
А3	-	-	0.15				
b	0.25	0.35	0.30				
D	1.95	2.05	2.00				
D2	0.85	1.05	0.95				
D2a	0.33	0.43	0.38				
E	1.95	2.05	2.00				
E2	1.05	1.25	1.15				
E2a	0.65	0.75	0.70				
е	0.65 BSC						
e2).863 BS					
е3		0.70 BS	С				
e4	C).325 BS	SC				
k		0.37 BS	С				
k1	0.15 BSC						
k2		0.36 BS	С				
L	0.225 0.325 0.275						
Z	0.20 BSC						
z1).110 BS					
z2	0.20 BSC						
All C	imens	ions in	mm				

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

U-DFN2020-6 (Type F)



Dimensions	Value
Dillicitatoria	(in mm)
С	0.650
Х	0.400
X1	0.480
X2	0.950
Х3	1.700
Y	0.425
Y1	0.800
Y2	1.150
Y3	1.450
Y4	2.300



IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

- A. Life support devices or systems are devices or systems which:
 - 1. are intended to implant into the body, or
 - 2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.
- B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2018, Diodes Incorporated

www.diodes.com

ПОСТАВКА ЭЛЕКТРОННЫХ КОМПОНЕНТОВ

многоканальный

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001 Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

Данный компонент на территории Российской Федерации Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г. Москва, ул. Щербаковская д. 3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru moschip.ru_6 moschip.ru 4 moschip.ru 9