



### DMP2039UFDE4

#### 25V P-CHANNEL ENHANCEMENT MODE MOSFET

### **Product Summary**

V <sub>(BR)DSS</sub>	R <sub>DS(on) max</sub>	<b>Ι</b> <sub>D</sub> Τ <sub>A</sub> = 25°C
-25V	$26m\Omega$ @ $V_{GS} = -4.5V$	-7.3
-25 V	40mΩ @ V <sub>GS</sub> = -1.8V	-6.0

# Description and Applications

This new generation MOSFET has been designed to minimize the onstate resistance ( $R_{DS(on)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

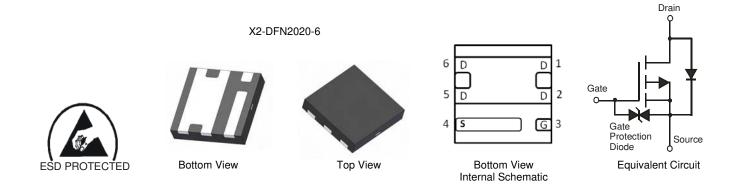
- Load Switching
- Battery Management Application
- Power Management Functions

### **Features and Benefits**

- Low R<sub>DS(ON)</sub> ensures on state losses are minimized
- 0.4mm profile ideal for low profile applications
- PCB footprint of 4mm<sup>2</sup>
- Low Input Capacitance
- ESD Protected Gate
- Lead, Halogen, and Antimony Free, RoHS Compliant (Note 1)
- "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

### **Mechanical Data**

- Case: X2-DFN2020-6
- 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
- Terminals: Finish NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.006 grams (approximate)



### Ordering Information (Note 3)

Part Number	Case	Packaging
DMP2039UFDE4-7	X2-DFN2020-6	3,000/Tape & Reel

Notes: 1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. No purposely added lead. Halogen and Antimony free.

Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com.
For packaging details, go to our website at http://www.diodes.com.

## **Marking Information**



PD = Product Type Marking Code YM = Date Code Marking Y = Year (ex: Y = 2011) M = Month (ex: 9 = September) Dot Denotes Pin 1

Date Code Key

Year	201	1	2012		2013	20	14	2015		2016	2	2017
Code	Υ		Z		Α	I	3	С		D		E
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code		^	0	4	_		7	0	^		N.I.	7



# **Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units		
Drain-Source Voltage	V <sub>DSS</sub>	-25	V		
Gate-Source Voltage			$V_{GSS}$	±8	V
Continuous Dyain Current (Note E) \/ 4 E\/	Steady State	T <sub>A</sub> = 25°C T <sub>A</sub> = 70°C	ID	-7.3 -5.8	А
Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V	t<5s	T <sub>A</sub> = 25°C T <sub>A</sub> = 70°C	I <sub>D</sub>	-9.2 -7.3	А
Steady $T_A = 25^{\circ}\text{C}$ State $T_A = 70^{\circ}\text{C}$		I <sub>D</sub>	-6.0 -4.7	А	
Continuous Drain Current (Note 5) V <sub>GS</sub> = -1.8V	t<5s	$T_A = 25$ °C $T_A = 70$ °C	I <sub>D</sub>	-7.6 -6.0	А
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	I <sub>DM</sub>	-60	Α		
Continuous Source-Drain Diode Current	I <sub>S</sub>	-2.0	Α		

# Thermal Characteristics @TA = 25°C unless otherwise specified

Characteristic		Symbol	Value	Units	
Total Power Dissipation (Note 4)	$T_A = 25^{\circ}C$	C	0.69	W	
Total Power Dissipation (Note 4)	$T_A = 70$ °C	$P_{D}$	0.44	vV	
Thermal Resistance, Junction to Ambient (Note 4)	Steady state	D	182	°C/W	
memial nesistance, Junction to Ambient (Note 4)	t<5s	$R_{\theta JA}$	113	G/ <b>VV</b>	
Total Power Dissipation (Note 5)	$T_A = 25^{\circ}C$	0	2.4	W	
Total Power Dissipation (Note 5)	$T_A = 70$ °C	$P_{D}$	1.5		
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	_	52	°C/W	
Thermal nesistance, Junction to Ambient (Note 3)	t<5s	$R_{ hetaJA}$	33	G/ VV	
Thermal Resistance, Junction to Case (Note 5)	Steady state	$R_{ heta JC}$	9.1	°C/W	
Operating and Storage Temperature Range		$T_{J_1}T_{STG}$	-55 to +150	°C	

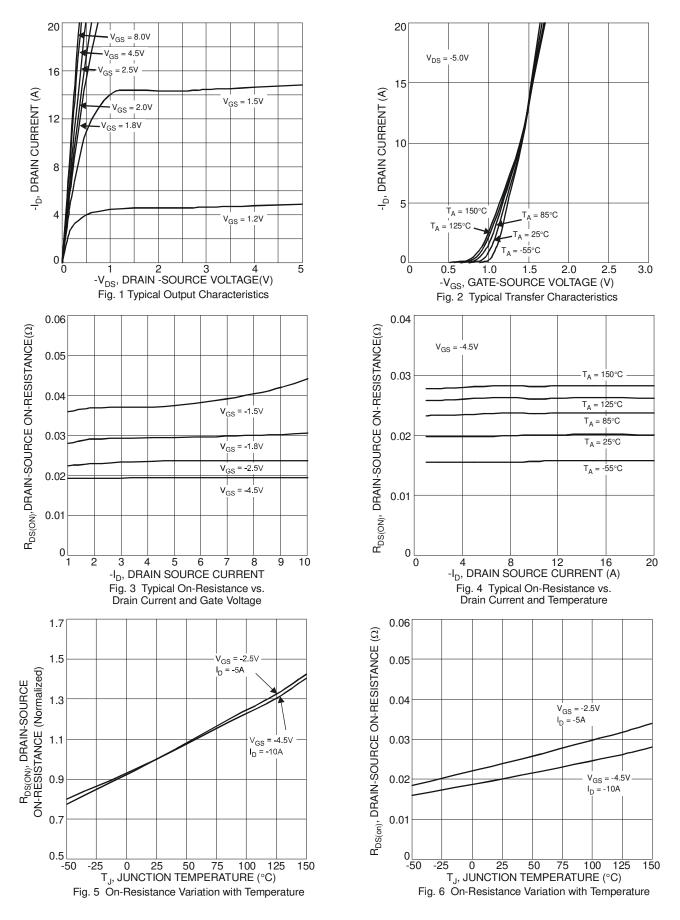
# Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 6)							
Drain-Source Breakdown Voltage	$BV_{DSS}$	-25		_	V	$V_{GS} = 0V, I_D = -250\mu A$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	_	_	-1	μΑ	$V_{DS} = -25V, V_{GS} = 0V$	
Gate-Source Leakage	I <sub>GSS</sub>	_	_	±10	μΑ	$V_{GS} = \pm 8.0 V, V_{DS} = 0 V$	
ON CHARACTERISTICS (Note 6)							
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.4		-1.0	V	$V_{DS} = V_{GS}$ , $I_D = -250\mu A$	
			19	26		$V_{GS} = -4.5V, I_D = -6.4A$	
Static Drain-Source On-Resistance	D		24	33	mΩ	$V_{GS} = -2.5V$ , $I_D = -4.8A$	
Static Diain-Source On-Nesistance	R <sub>DS</sub> (ON)		29	40	1115.2	$V_{GS} = -1.8V, I_D = -2.5A$	
			35	70		$V_{GS} = -1.5V$ , $I_D = -1.5A$	
Forward Transfer Admittance	Y <sub>fs</sub>	_	14	_	mS	$V_{DS} = -5V, I_{D} = -4A$	
Diode Forward Voltage (Note 5)	$V_{SD}$		-0.7	-1.0	V	$V_{GS} = 0V, I_{S} = -1A$	
DYNAMIC CHARACTERISTICS (Note 7)							
Input Capacitance	C <sub>iss</sub>		2530	_	pF	V 45V V 0V	
Output Capacitance	Coss		203	_	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V -f = 1.0MHz	
Reverse Transfer Capacitance	C <sub>rss</sub>		177	_	pF	1 = 1.0101112	
Gate Resistance	$R_g$		9.1	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$	
Total Gate Charge	Qg		28.2	_			
Gate-Source Charge	$Q_{gs}$		48.7	_	nC	$V_{DS} = -15V, I_{D} = -4.0A$	
Gate-Drain Charge	$Q_{gd}$		3.2	_			
Turn-On Delay Time	t <sub>D(on)</sub>	1	5.0	_			
Turn-On Rise Time	t <sub>r</sub>		15.1	_	nS	$V_{DD} = -15V$ , $V_{GS} = -4.5V$ , $R_G = 1\Omega$ ,	
Turn-Off Delay Time	t <sub>D(off)</sub>		23.5	_	113	$I_D = -4.0A$	
Turn-Off Fall Time	t <sub>f</sub>		137.6				

Notes:

- 4. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
- 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate 6. Short duration pulse test used to minimize self-heating effect
- 7. Guaranteed by design. Not subject to production testing.







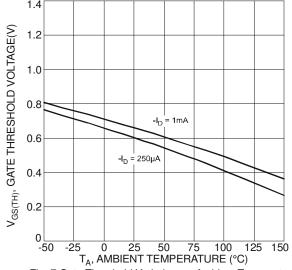
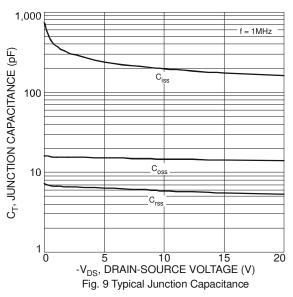
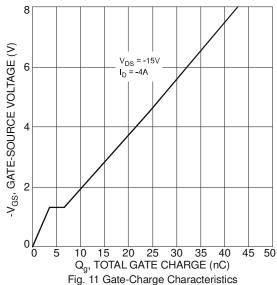
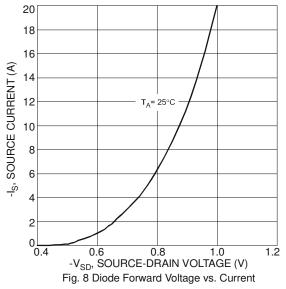


Fig. 7 Gate Threshold Variation vs. Ambient Temperature







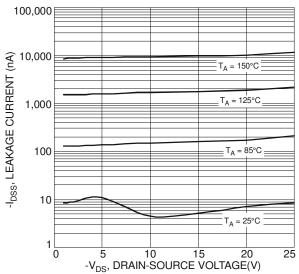
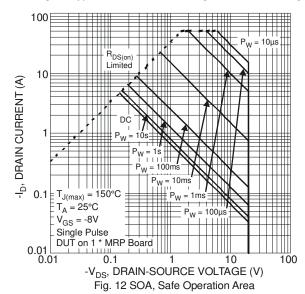
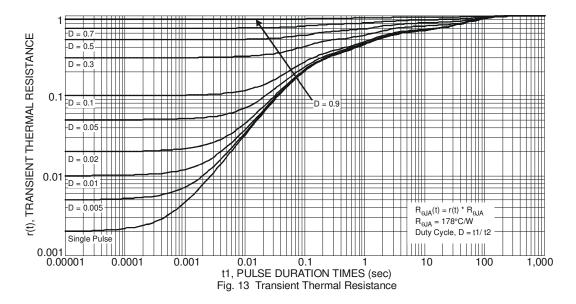


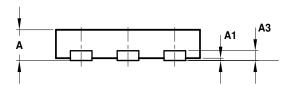
Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

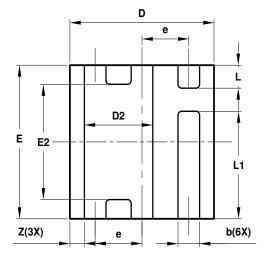






# **Package Outline Dimensions**

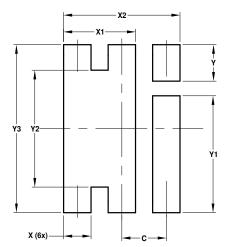




X2-DFN2020-6									
Dim	Dim Min Max Typ								
Α	-	0.40	_						
<b>A</b> 1	0	0.05	0.03						
A3	_	_	0.13						
b	0.25	0.35	0.30						
D	1.95	2.05	2.00						
D2	0.85	1.05	0.95						
Е	1.95	2.05	2.00						
E2	1.40	1.60	1.50						
е	-	-	0.65						
٦	0.25	0.35	0.30						
L1	1.35	1.45	1.40						
Z	_	_	0.20						
All Dimensions in mm									



### **Suggested Pad Layout**



Dimensions	Value (in mm)
С	0.650
Х	0.400
X1	1.050
X2	1.700
Υ	0.500
Y1	1.600
Y2	1.600
Y3	2.300

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