

DMP6023LFG

# 60V P-CHANNEL ENHANCEMENT MODE MOSFET POWERDI®

### **Product Summary**

V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>A</sub> = +25°C		
-60V	$25m\Omega @ V_{GS} = -10V$	-7.7A		
-007	$33m\Omega @ V_{GS} = -4.5V$	-6.8A		

#### **Features and Benefits**

- Low R<sub>DS(ON)</sub> ensures on state losses are minimized
- Small form factor thermally efficient package enables higher density end products
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- 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**

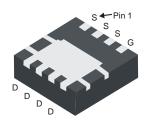
This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- Power Management Functions
- DC-DC Converters

#### **Mechanical Data**

- Case: POWERDI<sup>®</sup>3333-8
- Case Material: Molded Plastic, "Green" Molding Compound.
  UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish Matte Tin Annealed over Copper Leadframe.
  Solderable per MIL-STD-202, Method 208 (3)
- Weight: 0.072 grams (Approximate)

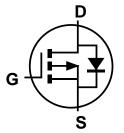
#### POWERDI3333-8



**Bottom View** 



Top View



**Equivalent Circuit** 

### **Ordering Information** (Note 4)

Part Number	Case	Packaging
DMP6023LFG-7	POWERDI3333-8	2,000/Tape & Reel
DMP6023LFG-13	POWERDI3333-8	3,000/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**



P23= Product Type Marking Code YYWW = Date Code Marking YY = Last Digit of Year (ex: 13 = 2013) WW = Week Code (01 ~ 53)



# **Maximum Ratings** ( $@T_A = +25^{\circ}C$ , unless otherwise specified.)

Characteristic	Symbol	Value	Units		
Drain-Source Voltage	$V_{DSS}$	-60	V		
Gate-Source Voltage			$V_{GSS}$	±20	V
Continuous Drain Current (Note C) V 40V	Steady State	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$	Ι <sub>D</sub>	-7.7 -6.2	А
Continuous Drain Current (Note 6) V <sub>GS</sub> = -10V	t<10s	$T_A = +25$ °C $T_A = +70$ °C	ID	-10.3 -8.2	А
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	I <sub>DM</sub>	-55	Α		
Maximum Continuous Body Diode Forward Current (	Is	-2.2	Α		
Avalanche Current, L = 0.1mH			I <sub>AS</sub>	-35.5	Α
Avalanche Energy, L = 0.1mH	Eas	62.9	mJ		

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

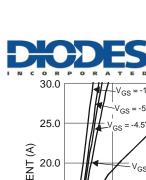
Characteristic	Symbol	Value	Units	
Total Power Dissipation (Note 5)		$P_{D}$	1.0	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	D	123	°C/W
t<10s		$R_{\theta JA}$	69	C/VV
Total Power Dissipation (Note 6)		P <sub>D</sub>	2.1	W
Thermal Pagistanes, Jungtion to Ambient (Note 6)	Steady State	<u> </u>	60	
Thermal Resistance, Junction to Ambient (Note 6) t<10s		$R_{\theta JA}$	34	°C/W
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	6.3		
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.)

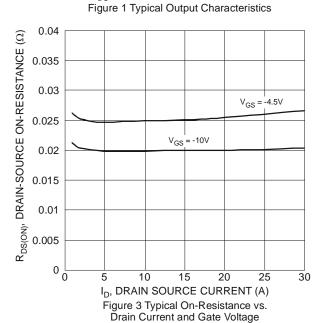
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-60	_	_	V	$V_{GS} = 0V, I_D = -250\mu A$	
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	_	_	-1	μΑ	$V_{DS} = -60V, V_{GS} = 0V$	
Gate-Source Leakage		_	_	±100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 7)							
Gate Threshold Voltage	$V_{GS(th)}$	-1	_	-3	V	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$	
Static Drain-Source On-Resistance	D	_	_	25	mΩ	$V_{GS} = -10V, I_D = -5A$	
Static Drain-Source Off-Resistance	R <sub>DS (ON)</sub>		_	33	11122	$V_{GS} = -4.5V$ , $I_{D} = -4A$	
Diode Forward Voltage	$V_{SD}$	_	-0.7	-1.2	V	$V_{GS} = 0V, I_{S} = -1A$	
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	Ciss	_	2569	_	pF	V 20V V 0V	
Output Capacitance	Coss	_	179	_	pF	$V_{DS} = -30V, V_{GS} = 0V,$ - f = 1MHz	
Reverse Transfer Capacitance	Crss	_	143	_	pF	71 = 1101112	
Gate Resistance	$R_g$	_	8		Ω	$V_{DS} = 0V$ , $V_{GS} = 0V$ , $f = 1MHz$	
Total Gate Charge (V <sub>GS</sub> = -4.5V,)	$Q_g$	_	26.5	_	nC		
Total Gate Charge (V <sub>GS</sub> = -10V),	$Q_{g}$	_	53.1		nC	$V_{DS} = -30V, I_{D} = -5A$	
Gate-Source Charge	$Q_{gs}$	_	7.1	_	nC	V <sub>DS</sub> = -30V, I <sub>D</sub> = -3A	
Gate-Drain Charge	$Q_{gd}$	_	12.6	_	nC		
Turn-On Delay Time	t <sub>D(on)</sub>	_	6	_	ns		
Turn-On Rise Time	t <sub>r</sub>	_	7.1	_	ns	$V_{GS} = -10V, V_{DS} = -30V,$	
Turn-Off Delay Time	t <sub>D(off)</sub>	_	110	_	ns	$R_G = 3\Omega$ , $I_D = -5A$	
Turn-Off Fall Time	t <sub>f</sub>	_	62		ns	1	
Body Diode Reverse Recovery Time	t <sub>rr</sub>	_	20	_	ns	L	
Body Diode Reverse Recovery Charge	Qrr	_	14	_	nC	I <sub>F</sub> = -5A, di/dt = 100A/μs	

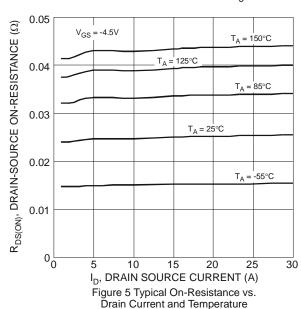
Notes: 5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.

- 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate
- 7. Short duration pulse test used to minimize self-heating effect.
- 8. Guaranteed by design. Not subject to product testing.



# $V_{GS} = -\overline{10V}$ V<sub>GS</sub> = -3.5V ID, DRAIN CURRENT (A) 15.0 $V_{GS} = -3.0V$ 10.0 V<sub>GS</sub> = -2.8V 5.0 0.0 0 V<sub>DS</sub>, DRAIN -SOURCE VOLTAGE (V)





# DMP6023LFG

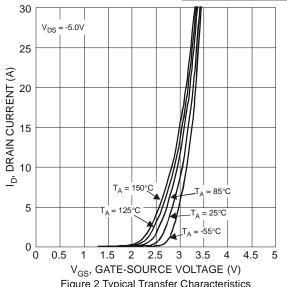


Figure 2 Typical Transfer Characteristics

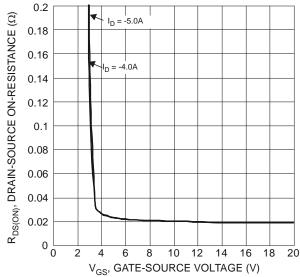


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

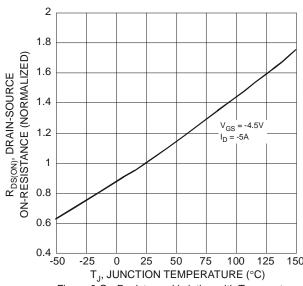


Figure 6 On-Resistance Variation with Temperature





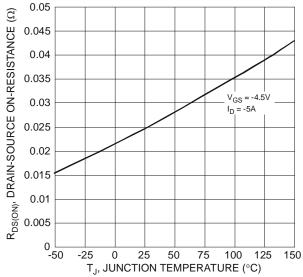
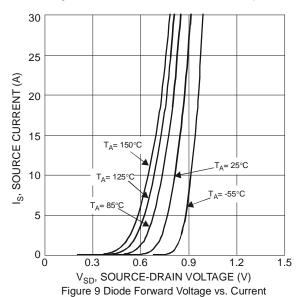
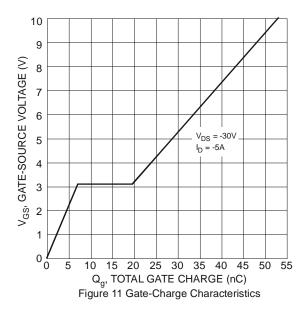


Figure 7 On-Resistance Variation with Temperature





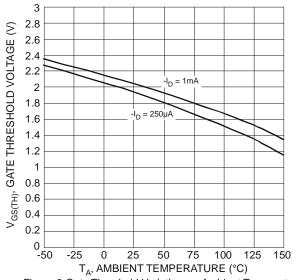
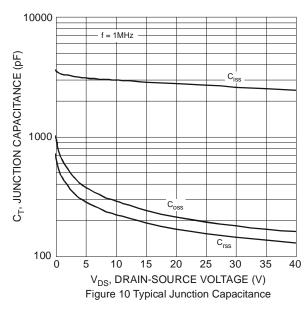
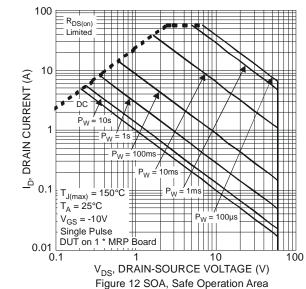
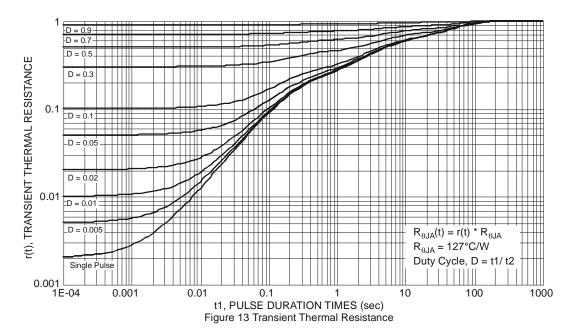


Figure 8 Gate Threshold Variation vs. Ambient Temperature



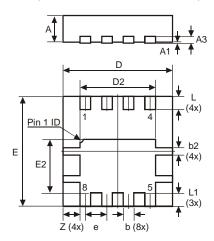






### **Package Outline Dimensions**

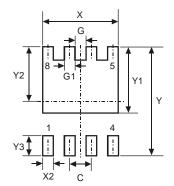
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



POWERDI®3333-8					
Dim	Min	Max	Тур		
D	3.25	3.35	3.30		
Е	3.25	3.35	3.30		
D2	2.22	2.32	2.27		
E2	1.56	1.66	1.61		
Α	0.75	0.85	0.80		
A1	0	0.05	0.02		
A3	-	_	0.203		
b	0.27	0.37	0.32		
b2	-	_	0.20		
L	0.35	0.45	0.40		
L1	-	_	0.39		
е	-	_	0.65		
Z	_	_	0.515		
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				
G	0.230				
G1	0.420				
Υ	3.700				
Y1	2.250				
Y2	1.850				
Y3	0.700				
Х	2.370				
X2	0.420				



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