

### 60V N-CHANNEL ENHANCEMENT MODE MOSFET PowerDI5060-8

## **Product Summary**

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> MAX	I <sub>D</sub> MAX T <sub>C</sub> = +25°C (Note 9)
60V	$3.1 \text{m}\Omega$ @ $V_{GS} = 10V$	100A

#### **Features**

- 100% Unclamped Inductive Switching Ensures More Reliable and Robust End Application
- Low R<sub>DS(ON)</sub> Minimizes Power Losses
- Low Q<sub>q</sub> Minimizes Switching Losses
- Lead-Free Finish; 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 ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- Switching
- Synchronous Rectification
- DC-DC Converters

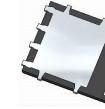
#### **Mechanical Data**

- Case: PowerDI<sup>®</sup>5060-8
- Case Material: Molded Plastic, "Green" Molding Compound;
   UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish Matte Tin Annealed over Copper Leadframe;
   Solderable per MIL-STD-202, Method 208 <sup>®</sup>
- Weight: 0.097 grams (Approximate)

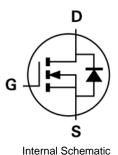
#### PowerDI5060-8

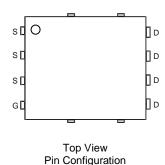


Top View



Bottom View





## Ordering Information (Note 4)

Ī	Part Number	Case	Packaging
	DMT6004SPS-13	PowerDI5060-8	2,500 / Tape & Reel

Notes:

1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.

Pin1

- 2. See http://www.diodes.com/quality/lead\_free/ 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**

D D D D
T6004SS
YY WW
O
S S S G

PowerDI5060-8

);; = Manufacturer's Marking T6004SS = Product Type Marking Code YYWW = Date Code Marking YY = Year (ex: 18 = 2018) WW = Week (01 to 53)

PowerDI is a registered trademark of Diodes Incorporated.



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

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V <sub>DSS</sub>	60	V	
Gate-Source Voltage	V <sub>GSS</sub>	±20	V	
Continuous Drain Current (Note 5)	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$	ID	23 18	А
Continuous Drain Current (Note 6)	T <sub>C</sub> = +25 (Note 9)	I <sub>D</sub>	100	А
	T <sub>C</sub> = +100°C		100	
Maximum Continuous Body Diode Forward Current (Note 6)	I <sub>S</sub>	88	А	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	200	А	
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)	I <sub>SM</sub>	200	Α	
Avalanche Current, L=0.2mH		I <sub>AS</sub>	45	Α
Avalanche Energy, L=0.2mH		Eas	200	mJ

## **Thermal Characteristics**

Characteristic	Symbol	Value	Unit	
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	2.5	W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	47	°C/W	
Total Power Dissipation (Note 6)	T <sub>C</sub> = +25°C	P <sub>D</sub>	139	W
Thermal Resistance, Junction to Case	R <sub>0</sub> JC	0.9	°C/W	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C	

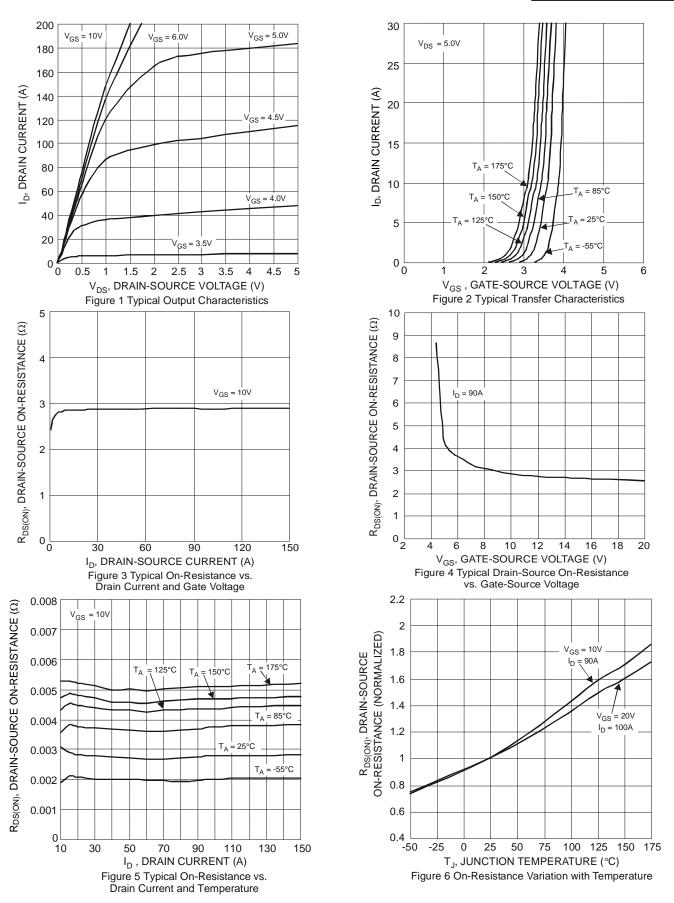
# **Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	_	_	V	$V_{GS} = 0V$ , $I_D = 1mA$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	l	_	1	μA	$V_{DS} = 48V, V_{GS} = 0V$	
Gate-Source Leakage	I <sub>GSS</sub>		_	±100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 7)							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	2	2.5	4	V	$V_{DS} = V_{GS}$ , $I_D = 250\mu A$	
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>		_	3.1	mΩ	$V_{GS} = 10V, I_D = 50A$	
Diode Forward Voltage	$V_{SD}$	1	0.9	1.2	V	$V_{GS} = 0V, I_S = 20A$	
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	C <sub>iss</sub>	1	4,556	_		$V_{DS} = 30V$ , $V_{GS} = 0V$ , $f = 1MHz$	
Output Capacitance	Coss		1,383	_	pF		
Reverse Transfer Capacitance	C <sub>rss</sub>		105.2	_			
Gate Resistance	Rg	1	0.7	_	Ω	$V_{DS} = 0V$ , $V_{GS} = 0V$ , $f = 1MHz$	
Total Gate Charge	Qg		95.4	_		$V_{DD} = 30V, I_D = 90A,$ $V_{GS} = 10V$	
Gate-Source Charge	Qgs	_	21.6	_	nC		
Gate-Drain Charge	$Q_{gd}$	_	20.4	_		VGS — 10 V	
Turn-On Delay Time	t <sub>D(ON)</sub>	_	13.2	_		$V_{DD} = 30V, V_{GS} = 10V,$ $I_{D} = 90A, R_{g} = 3.5\Omega$	
Turn-On Rise Time	t <sub>R</sub>	_	11.7	_			
Turn-Off Delay Time	t <sub>D(OFF)</sub>	_	31	_	ns		
Turn-Off Fall Time	t <sub>F</sub>	_	12	_			
Body Diode Reverse Recovery Time	t <sub>RR</sub>	_	50.5	_	ns		
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>		80.8	_	nC	I <sub>F</sub> = 50A, di/dt = 100A/μs	

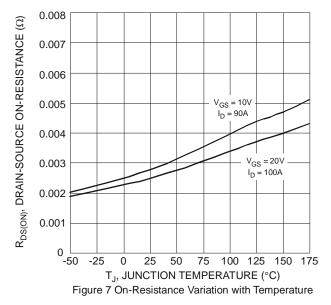
 Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
 Thermal resistance from junction to soldering point (on the exposed drain pad).
 Short duration pulse test used to minimize self-heating effect. Notes:

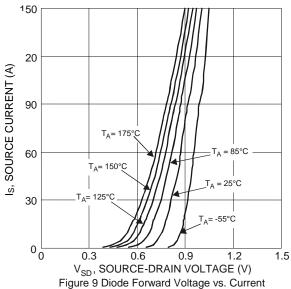
Guaranteed by design. Not subject to production testing.
 Package limited.

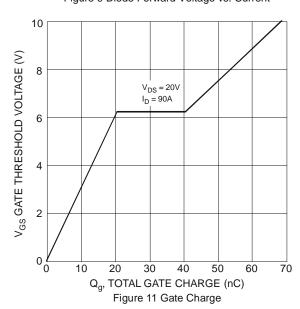












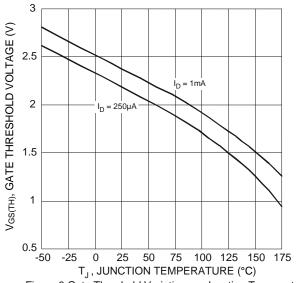
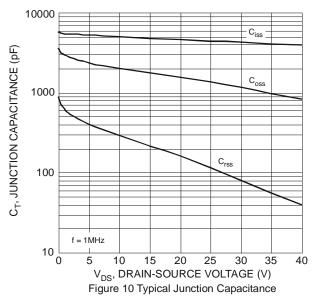
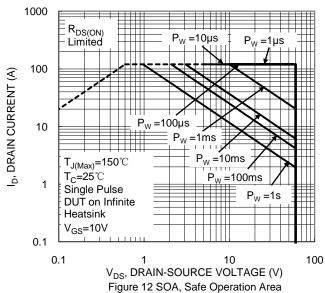
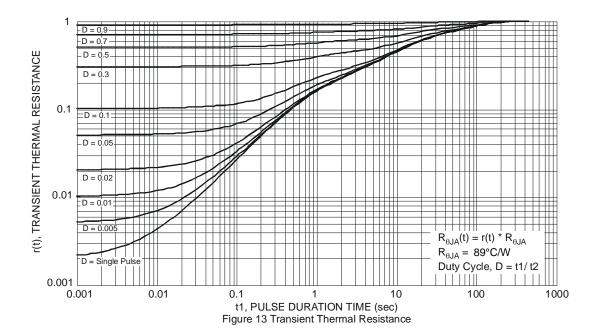


Figure 8 Gate Threshold Variation vs. Junction Temperature







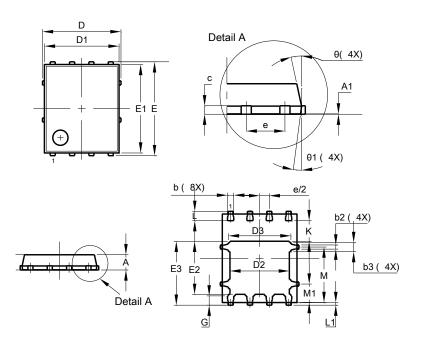




## **Package Outline Dimensions**

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

#### PowerDI5060-8

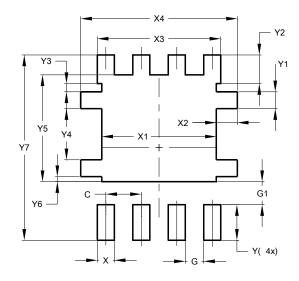


PowerDI5060-8						
			Тур			
A	0.90	1.10	1.00			
A1	0.00	0.05	-			
b	0.33	0.51	0.41			
b2	0.200	0.350	0.273			
b3	0.40	0.80	0.60			
С	0.230	0.330	0.277			
D	ţ	5.15 BSC	;			
D1	4.70	5.10	4.90			
D2	3.70	4.10	3.90			
D3	3.90 4.30 4.10					
Е	(	6.15 BSC	;			
E1	5.60	6.00	5.80			
E2	3.28	3.28 3.68 3.4				
E3	3.99 4.39 4.19					
е		1.27 BSC	;			
G	0.51	0.71	0.61			
K	0.51	-	_			
L	0.51	0.71	0.61			
L1	0.100	0.200	0.175			
M	3.235 4.035 3.63					
M1	1.00	1.40	1.21			
Θ	10°	12º	11º			
Θ1	6º	8º	7º			
All Dimensions in mm						

## **Suggested Pad Layout**

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

#### PowerDI5060-8



Dimensions	Value (in mm)
С	1.270
G	0.660
G1	0.820
Х	0.610
X1	4.100
X2	0.755
Х3	4.420
X4	5.610
Υ	1.270
Y1	0.600
Y2	1.020
Y3	0.295
Y4	1.825
Y5	3.810
Y6	0.180
Y7	6.610



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