



#### 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
	6mΩ @ V <sub>GS</sub> = 10V	65A
30V	9.8mΩ @ V <sub>GS</sub> = 4.5V	55A

#### **Features and Benefits**

- Low R<sub>DS(ON)</sub> Minimizes On-State Losses
- Excellent Q<sub>gd</sub> x R<sub>DS(ON)</sub> Product (FOM)
- Advanced Technology for DC-DC Converters
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- 100% Unclamped Inductive Switching Ensures More Reliability
- 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<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**

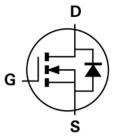
- Case: PowerDI5060-8
- Case Material: Molded Plastic, "Green" Molding Compound.
   UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish Matte Tin Annealed over Copper Leadframe.
   Solderable per MIL-STD-202, Method 208 <a>3</a>
- Weight: 0.097 grams (Approximate)



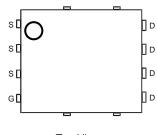




**Bottom View** 



Internal Schematic



Top View Pin Configuration

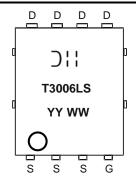
#### Ordering Information (Note 4)

Part Number	Case	Packaging
DMT3006LPS-13	PowerDI5060-8	2,500/Tape & Reel

Notes:

- 1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
- 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**



⊃¦¦ = Manufacturer's Marking T3006LS = Product Type Marking Code YYWW = Date Code Marking YY = Year (ex: 17 = 2017) WW = Week (01 to 53)



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

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage		V <sub>DSS</sub>	30	V
Gate-Source Voltage		V <sub>GSS</sub>	±20	V
Continuous Drain Current, V <sub>GS</sub> = 10V (Note 6)	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$	I <sub>D</sub>	16 12	А
Continuous Drain Current, V <sub>GS</sub> = 10V (Note 7)	T <sub>C</sub> = +25°C T <sub>C</sub> = +70°C	I <sub>D</sub>	65 50	А
Maximum Continuous Body Diode Forward Current (Note 6)	I <sub>S</sub>	3	Α	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	100	Α	
Avalanche Current, L = 0.1mH (Note 8)	I <sub>AS</sub>	25	Α	
Avalanche Energy, L = 0.1mH (Note 8)	Eas	31	mJ	

## **Thermal Characteristics**

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	$P_{D}$	1.3	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	99	°C/W
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	2.6	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	50	°C/W
Total Power Dissipation (Note 7)	T <sub>C</sub> = +25°C	P <sub>D</sub>	42	W
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	3	°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.)

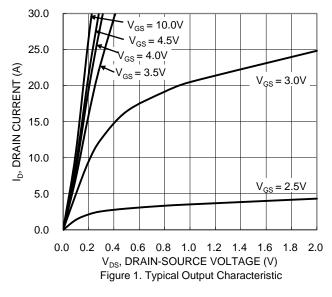
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 9)							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	_	_	V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	_	_	1	μΑ	$V_{DS} = 24V, V_{GS} = 0V$	
Gate-Source Leakage	I <sub>GSS</sub>	-	_	±100	nA	$V_{GS} = 20V, V_{DS} = 0V$ $V_{GS} = -16V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 9)							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1.0	_	3.0	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	_	4.8	6	mΩ	$V_{GS} = 10V, I_D = 20A$	
Static Drain-Source On-Resistance		_	6.8	9.8		$V_{GS} = 4.5V, I_D = 20A$	
Diode Forward Voltage	V <sub>SD</sub>	_	0.7	1.0	V	$V_{GS} = 0V$ , $I_S = 2A$	
DYNAMIC CHARACTERISTICS (Note 10)							
Input Capacitance	Ciss	_	1,155	_		V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz	
Output Capacitance	Coss	_	456	_	pF		
Reverse Transfer Capacitance	C <sub>rss</sub>	_	72	_			
Gate Resistance	$R_g$	1	1.6	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$	
Total Gate Charge (V <sub>GS</sub> = 10V)	Qq	_	16.7	_			
Total Gate Charge (V <sub>GS</sub> = 4.5V)	$Q_g$	_	8.4	_	nC	$V_{DD} = 15V, I_D = 9A$	
Gate-Source Charge	$Q_{gs}$		2.2	_	nc		
Gate-Drain Charge	$Q_{gd}$	_	3.5	_			
Turn-On Delay Time	t <sub>D(ON)</sub>	_	3.5	_		$V_{DD} = 15V, V_{GS} = 10V,$ $R_{G} = 3\Omega, I_{D} = 9A$	
Turn-On Rise Time	t <sub>R</sub>	_	5.5	_	20		
Turn-Off Delay Time	t <sub>D(OFF)</sub>		13.5	_	ns		
Turn-Off Fall Time	t <sub>F</sub>		4.6	_			
Reverse Recovery Time	t <sub>RR</sub>	_	19.3	_	ns	1 4 5 4 11/1/4 400 4 /	
Reverse Recovery Charge	$Q_{RR}$		8.6		nC	$I_F = 1.5A$ , $dI/dt = 100A/\mu s$	

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

Device mounted on FR-4 FC board, with minimine technimerided pad rayout, single sided.
 Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 Thermal resistance from junction to soldering point (on the exposed drain pad).
 I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
 Short duration pulse test used to minimize self-heating effect.

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





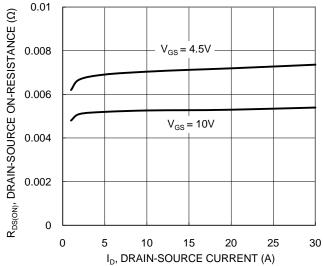


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

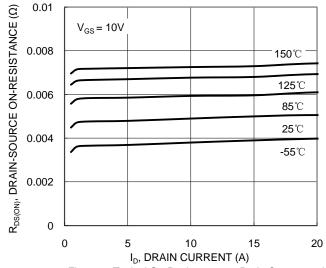
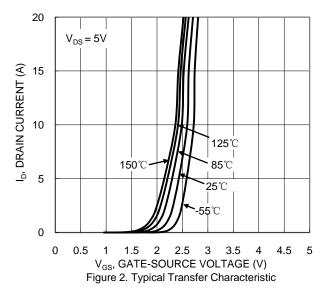
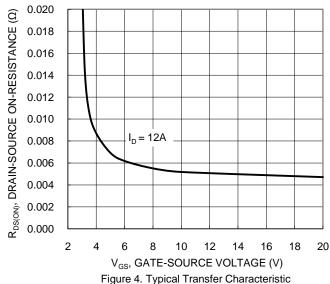


Figure 5. Typical On-Resistance vs. Drain Current and Temperature





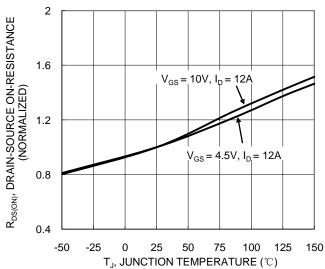


Figure 6. On-Resistance Variation with Temperature



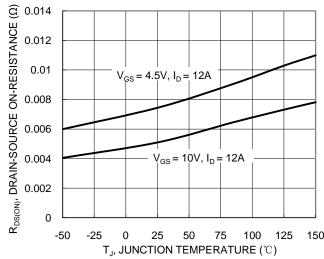


Figure 7. On-Resistance Variation with Temperature

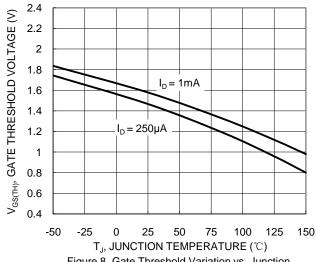
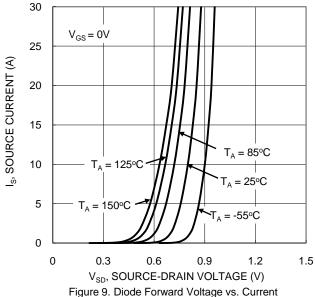


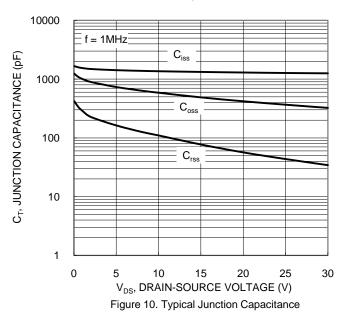
Figure 8. Gate Threshold Variation vs. Junction Temperature



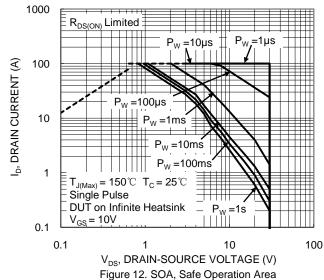
 $V_{DS} = 15V, I_{D} = 12A$ 

15

20



25



10

8

6

4

2

0

0

5

10

 $Q_{\alpha}$  (nC)

Figure 11. Gate Charge

 $V_{GS}(V)$ 



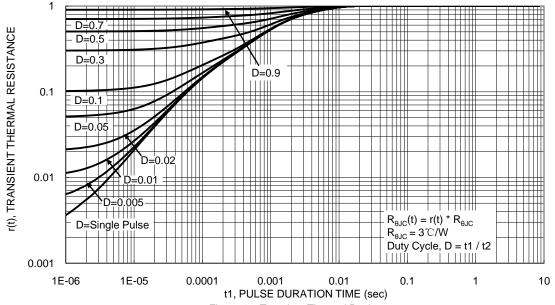


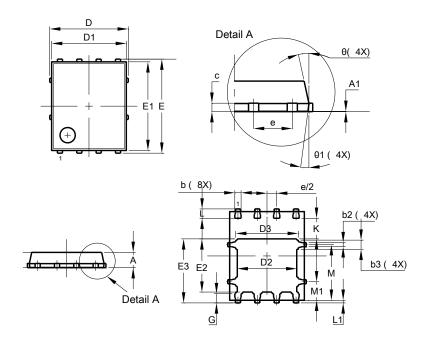
Figure 13. Transient Thermal Resistance



## **Package Outline Dimensions**

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

#### PowerDI5060-8

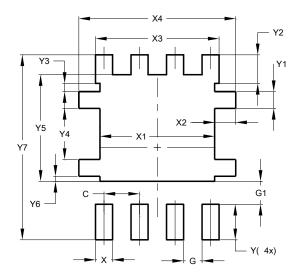


PowerDI5060-8					
Dim	Min	Max	Тур		
Α	0.90	1.10	1.00		
A1	0.00	0.05			
b	0.33	0.51	0.41		
b2	0.200	0.350	0.273		
b3	0.40	0.80	0.60		
C	0.230	0.330	0.277		
D	ţ	5.15 BSC	;		
D1	4.70	5.10	4.90		
D2	3.70	4.10	3.90		
D3	3.90	4.30	4.10		
Е	6.15 BSC				
E1	5.60	6.00	5.80		
E2	3.28	3.68	3.48		
E3	3.99	4.39	4.19		
е	1.27 BSC				
G	0.51	0.71	0.61		
K	0.51	-	_		
٦	0.51	0.71	0.61		
L1	0.100	0.200	0.175		
M	3.235	4.035	3.635		
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			
X	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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многоканальный

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