



40V +175°C N-CHANNEL ENHANCEMENT MODE MOSFET PowerDI5060-8

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D T _C = +25°C (Note 9)
40V	$1.8 \text{m}\Omega$ @ $V_{GS} = 10 \text{V}$	100A

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.

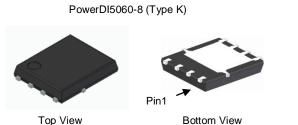
- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

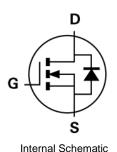
Features

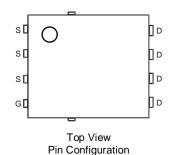
- Rated to +175°C Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching (UIS) Test in Production Ensures More Reliable and Robust End Application
 - Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low R_{DS(ON)} Minimizes On State Losses
- <1.1mm Package Profile Ideal for Thin Applications
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- An Automotive-Compliant Part is Available Under Separate Datasheet (DMTH41M8SPSQ)

Mechanical Data

- Case: PowerDI[®] 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 (§3)
- Weight: 0.097 grams (Approximate)







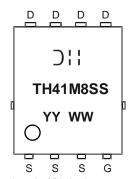
Ordering Information (Note 4)

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Part Number	Case	Packaging
DMTH41M8SPS-13	PowerDI5060-8 (Type K)	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.
- 2. See https://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



☐ I = Manufacturer's Marking
TH41M8SS = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 19 = 2019)
WW = Week Code (01 to 53)

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V_{DSS}	40	V	
Gate-Source Voltage			±20	V
Continuous Drain Current, V _{GS} = 10V (Notes 6 & 9)	$T_{C} = +25^{\circ}C$ $T_{C} = +100^{\circ}C$	Δ	100 100	А
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	400	Α	
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)	I _{SM}	400	Α	
Continuous Body Diode Forward Current (Note 7)	$T_C = +25$ °C	Is	100	Α
Avalanche Current, L = 0.1mH	I _{AS}	72.8	Α	
Avalanche Energy, L = 0.1mH		E _{AS}	265	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P _D	3.03	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	49	°C/W
Total Power Dissipation (Note 6)	P _D	150	W
Thermal Resistance, Junction to Case (Note 6)	$R_{ heta JC}$	1.0	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +175	°C

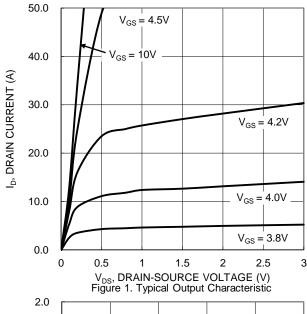
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)							
Drain-Source Breakdown Voltage	BV _{DSS}	40	_	_	V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current	I _{DSS}	_	_	1	μΑ	$V_{DS} = 32V, V_{GS} = 0V$	
Gate-Source Leakage	I _{GSS}	_	_	±100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 7)							
Gate Threshold Voltage	V _{GS(TH)}	2	-	4	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$	
Static Drain-Source On-Resistance	R _{DS(ON)}	l	1.4	1.8	mΩ	$V_{GS} = 10V, I_D = 30A$	
Diode Forward Voltage	V_{SD}	I	0.8	1.2	V	$V_{GS} = 0V, I_{S} = 20A$	
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	C _{iss}	_	6968	_		V _{DS} = 20V, V _{GS} = 0V, f = 1MHz	
Output Capacitance	Coss	_	1812	_	pF		
Reverse Transfer Capacitance	C _{rss}	_	59	_			
Gate Resistance	R_G	_	1.21	_	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$	
Total Gate Charge	Qg	_	79.5	_		$V_{DD} = 20V, I_D = 90A,$	
Gate-Source Charge	Q_{gs}	_	20.6	_	nC		
Gate-Drain Charge	Q_{gd}	_	16.5	_		$V_{GS} = 10V$	
Turn-On Delay Time	t _{D(ON)}	_	13.3	_		$V_{DD} = 20V, V_{GS} = 10V,$ $I_{D} = 90A, R_{G} = 3.5\Omega$	
Turn-On Rise Time	t _R	_	41.3	_	ns		
Turn-Off Delay Time	t _D (OFF)	_	35.1	_			
Turn-Off Fall Time	t _F	_	13.7	_			
Reverse Recovery Time	t _{RR}	_	62	_	ns	I F0A di/dt _ 100A/up	
Reverse Recovery Charge	Q _{RR}	_	103	_	nC	I _F = 50A, di/dt = 100A/μs	

- 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).
 Short duration pulse test used to minimize self-heating effect.
 Guaranteed by design. Not subject to product testing.
 Limited by package.

DMTH41M8SPS





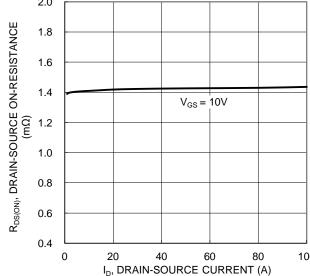


Figure 3. Typical On-Resistance vs. Drain Current and

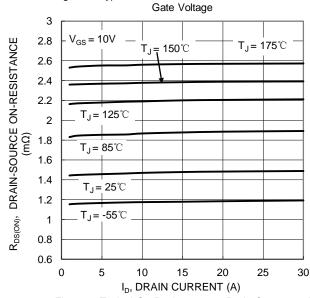
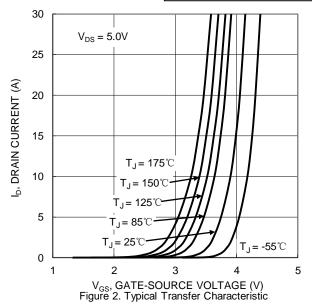
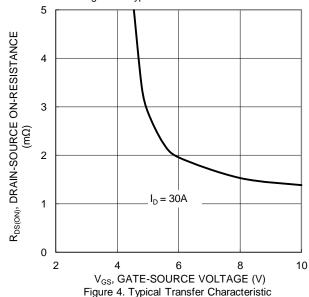


Figure 5. Typical On-Resistance vs. Drain Current and Temperature





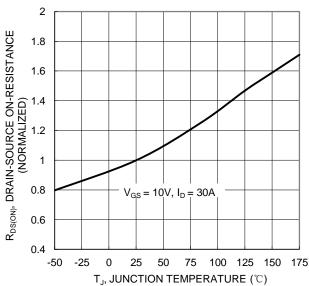
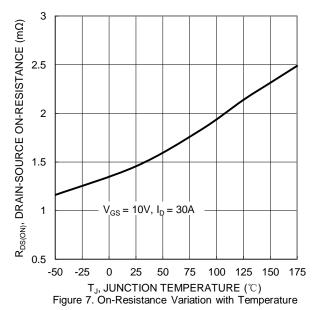
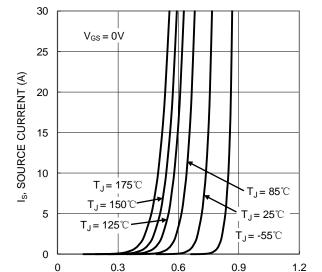


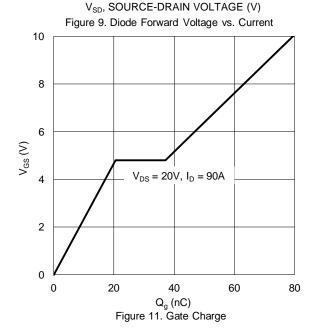
Figure 6. On-Resistance Variation with Temperature











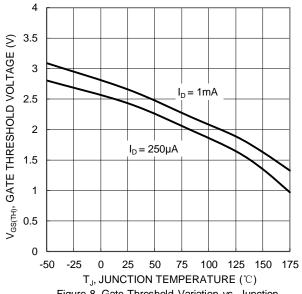


Figure 8. Gate Threshold Variation vs. Junction Temperature

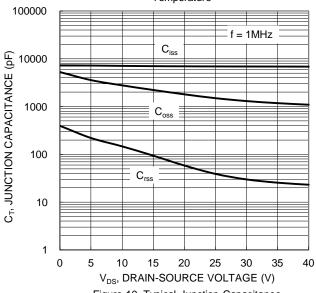
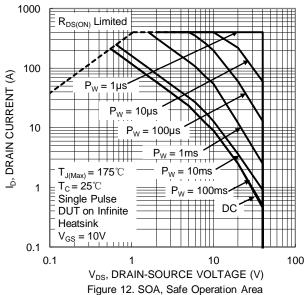


Figure 10. Typical Junction Capacitance





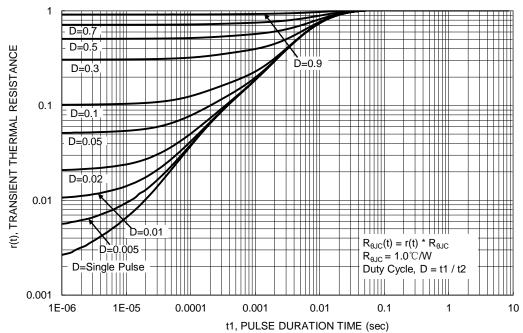


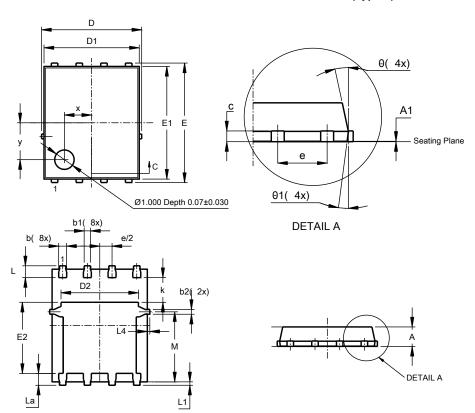
Figure 13. Transient Thermal Resistance



Package Outline Dimensions

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

PowerDI5060-8 (Type K)

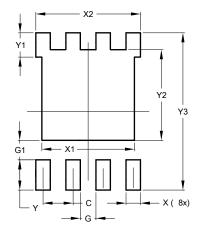


PowerDI5060-8						
(Type K)						
Dim	Min	Max	Тур			
Α	0.90	1.10	1.00			
A1	0	0.05	0.02			
b	0.33	0.51	0.41			
b1	0.300	0.366	0.333			
b2	0.20	0.35	0.25			
С	0.23	0.33	0.277			
D	5	.15 BS0)			
D1	4.85	4.95	4.90			
D2	-	-	3.98			
Е	6.15 BSC					
E1	5.75	5.85	5.80			
E2	3.56	3.725	3.66			
е	1	.27BSC				
k	-	-	1.27			
L	0.51	0.71	0.61			
La	0.51	0.675	0.61			
L1	0.05	0.20	0.175			
L4	-	-	0.125			
M	3.50	3.71	3.605			
X	-	-	1.400			
у	-	-	1.900			
θ	10°	12°	11°			
θ1	6°	8°	7°			
All Dimensions in mm						

Suggested Pad Layout

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

PowerDI5060-8 (Type K)



Dimensions	Value (in mm)		
С	1.270		
G	0.660		
G1	0.820		
X	0.610		
X1	3.910		
X2	4.420		
Υ	1.270		
Y1	1.020		
Y2	3.810		
Y3	6.610		

March 2019



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