



N-CHANNEL ENHANCEMENT MODE MOSFET POWERDI

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
30V	1.35mΩ @ V _{GS} = 10V	150A
	2.4mΩ @ V _{GS} = 4.5V	100A

Features and Benefits

- Low R_{DS(ON)} Minimizes On-State Losses
- Excellent Q_{gd} x R_{DS(ON)} 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)

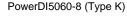
Description and Applications

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.

- Backlighting
- Power Management Functions
- DC-DC Converters

Mechanical Data

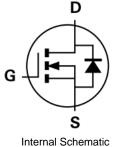
- Case: PowerDI5060-8 (Type K)
- Case Material: Molded Plastic, "Green" Molding Compound.
 UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish Matte Tin Annealed over Copper Leadframe.
 Solderable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

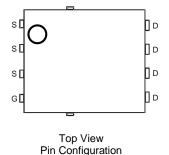






Top View Bottom View





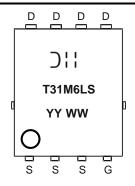
Ordering Information (Note 4)

Part Number	Case	Packaging	
DMT31M6LPS-13	PowerDI5060-8 (Type K)	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 http://www.diodes.com/products/packages.html.

Marking Information



⊃¦¦ = Manufacturer's Marking T31M6LS = Product Type Marking Code YYWW = Date Code Marking YY = Year (ex: 16 = 2016) WW = Week (01 to 53)



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

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V _{DSS}	30	V	
Gate-Source Voltage	V _{GSS}	±20	V	
Continuous Drain Current, V _{GS} = 10V (Note 6)	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$	I _D	35.8 28.6	А
Continuous Drain Current, $V_{GS} = 10V$ (Note 7) $T_C = +25^{\circ}C$ $T_C = +70^{\circ}C$		I _D	150 128	А
Maximum Continuous Body Diode Forward Current (Note 7)	I _S	83	Α	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	160	Α	
Avalanche Current, L=1mH	I _{AS}	25.5	Α	
Avalanche Energy, L=1mH	E _{AS}	325	mJ	

Thermal Characteristics

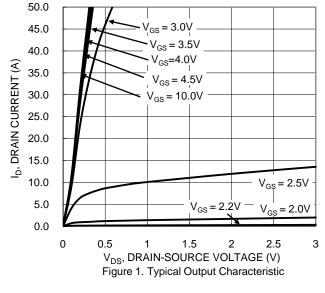
Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T _A = +25°C	P_{D}	1.3	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{ heta JA}$	99	°C/W
Total Power Dissipation (Note 6)	T _A = +25°C	P_{D}	2.5	W
Thermal Resistance, Junction to Ambient (Note 6)		$R_{ heta JA}$	50	°C/W
Total Power Dissipation (Note 7)	T _C = +25°C	P _D	100	W
Thermal Resistance, Junction to Case (Note 7)		$R_{ heta JC}$	1.2	°C/W
Operating and Storage Temperature Range		T _{J,} T _{STG}	-55 to +150	°C

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

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 8)							
Drain-Source Breakdown Voltage	BV _{DSS}	30	_	_	V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current	I _{DSS}	_	_	1	μΑ	$V_{DS} = 24V, V_{GS} = 0V$	
Gate-Source Leakage	I _{GSS}	_	-	±100	nA	$V_{GS} = 20V, V_{DS} = 0V$ $V_{GS} = -16V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 8)							
Gate Threshold Voltage	V _{GS(TH)}	1	1	3	٧	$V_{DS} = V_{GS}$, $I_D = 250\mu A$	
Static Drain-Source On-Resistance			1.1	1.35	mΩ	$V_{GS} = 10V, I_D = 20A$	
Static Dialii-Source Off-Resistance	R _{DS(ON)}		1.6	2.4	11122	$V_{GS} = 4.5V, I_D = 20A$	
Diode Forward Voltage	V_{SD}	_	_	1.2	V	$V_{GS} = 0V, I_{S} = 2A$	
DYNAMIC CHARACTERISTICS (Note 19)							
Input Capacitance	C _{iss}		7019	_		V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz	
Output Capacitance	Coss	_	3372	_	pF		
Reverse Transfer Capacitance	Crss	_	554	_			
Gate Resistance	R_g	_	0.94	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$	
Total Gate Charge (V _{GS} = 10V)	Q_g	_	123	_		V _{DD} = 15V, I _D = 20A	
Total Gate Charge (V _{GS} = 4.5V)	Q_g	_	59.1	_	nC		
Gate-Source Charge	Q_{gs}		14.9	_	IIC		
Gate-Drain Charge	Q_{gd}	_	24.5	_			
Turn-On Delay Time	t _{D(ON)}	_	8.6	_		$V_{DD} = 15V, V_{GS} = 10V,$ $R_g = 3\Omega, I_D = 20A$	
Turn-On Rise Time	t _R	_	20.2	_			
Turn-Off Delay Time	t _{D(OFF)}	_	71.5	_	ns		
Turn-Off Fall Time	t _F	_	42.3	_			
Body Diode Reverse Recovery Time	t _{RR}		37.2	_	ns	1 20A -11/-14 F00A/	
Body Diode Reverse Recovery Charge	Q_{RR}	_	73.6	_	nC	I _F = 20A, dl/dt = 500A/μs	

- 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 1inch square copper plate.
- 7. Thermal resistance from junction to soldering point (on the exposed drain pad).
- 8. Short duration pulse test used to minimize self-heating effect.
- 9. Guaranteed by design. Not subject to product testing.





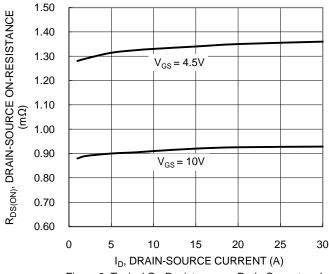


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

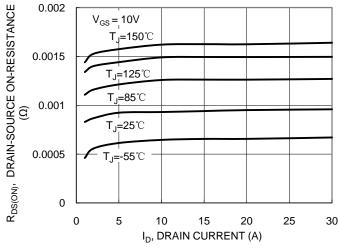
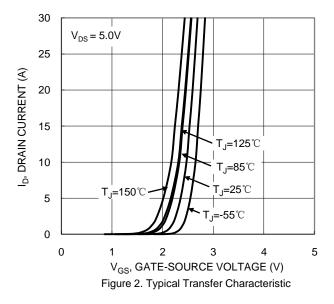


Figure 5. Typical On-Resistance vs. Drain Current and Temperature



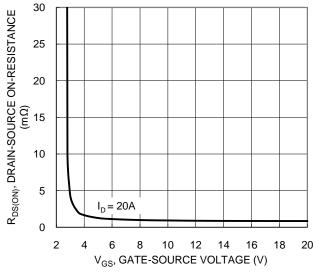


Figure 4. Typical Transfer Characteristic

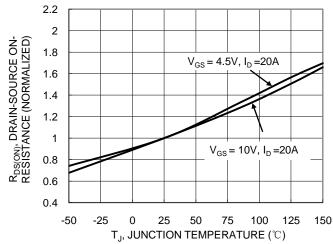


Figure 6. On-Resistance Variation with Temperature





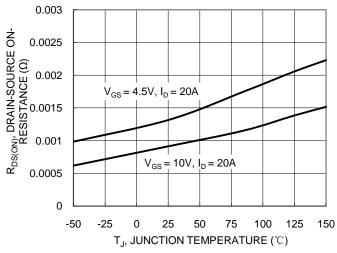
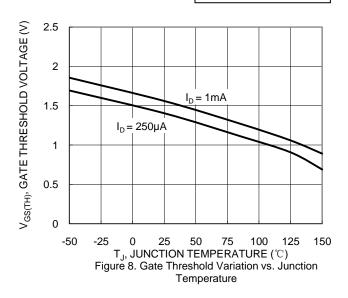
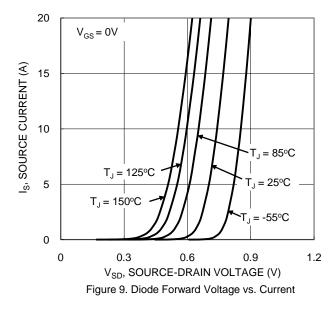
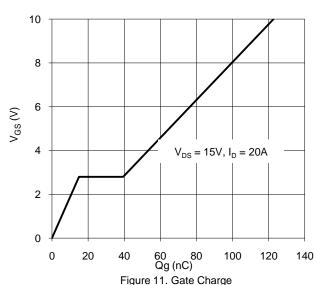


Figure 7. On-Resistance Variation with Temperature







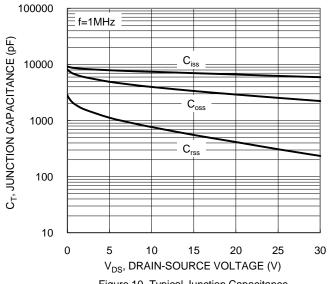


Figure 10. Typical Junction Capacitance

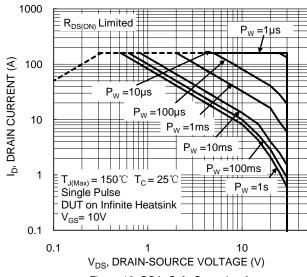


Figure 12. SOA, Safe Operation Area



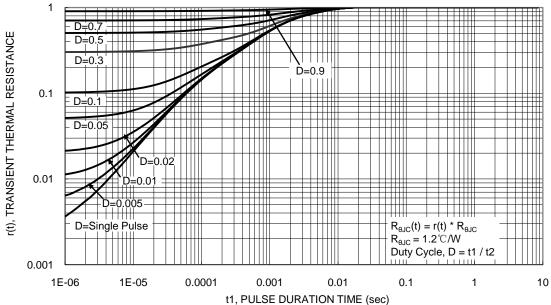


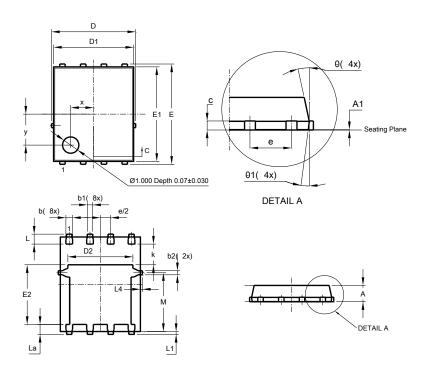
Figure 13. Transient Thermal Resistance



Package Outline Dimensions

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

PowerDI5060-8 (Type K)

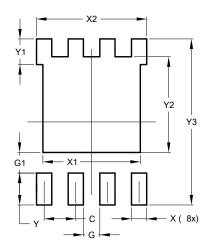


PowerDI5060-8					
(Type K)					
Dim	Min	Тур			
Α	0.90	1.10	1.00		
A1	0	0.05	0.02		
b	0.33	0.51	0.41		
b1	0.300	0.366	0.333		
b2	0.20	0.35	0.25		
С	0.23	0.33	0.277		
D	5	.15 BS0)		
D1	4.85	4.95	4.90		
D2	-	-	3.98		
Е	6	.15 BS0)		
E1	5.75	5.85	5.80		
E2	3.56	3.725	3.66		
Е	1	.27BSC			
k	-	-	1.27		
L	0.51	0.71	0.61		
La	0.51	0.675	0.61		
L1	0.05	0.20	0.175		
L4	-	-	0.125		
М	3.50	3.71	3.605		
Х	-	-	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		
Х	0.610		
X1	3.910		
X2	4.420		
Υ	1.270		
Y1	1.020		
Y2	3.810		
Y3	6.610		



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