

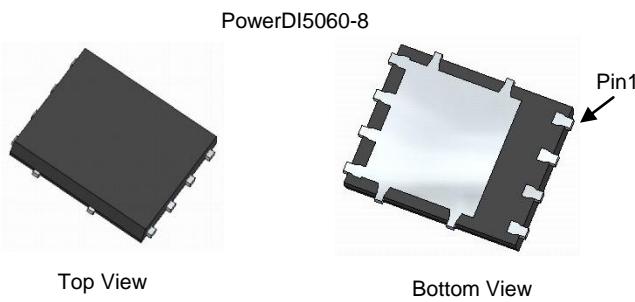
Product Summary

BV_{DSS}	$R_{DS(ON)} \text{ Max}$	I_D $T_c = +25^\circ\text{C}$
40V	2.5mΩ @ $V_{GS} = 10\text{V}$	90A
	4mΩ @ $V_{GS} = 4.5\text{V}$	90A

Description and Applications

This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$), yet maintain superior switching performance, making it ideal for high efficiency power management applications.

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

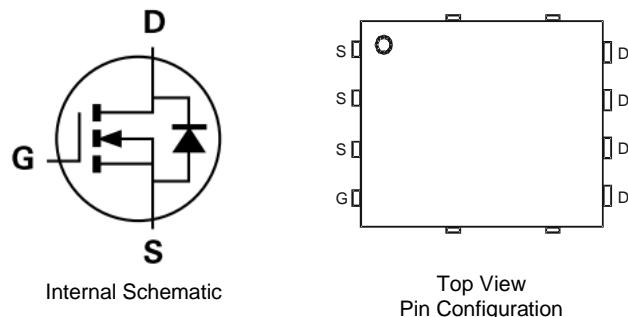


Features

- 100% Unclamped Inductive Switching – ensures more reliable and robust end application
- Low $R_{DS(ON)}$ – minimizes power losses
- Low Q_g – 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

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 Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.097 grams (Approximate)



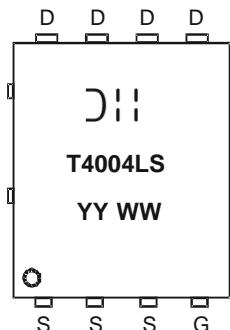
Ordering Information (Note 4)

Part Number	Case	Packaging
DMT4004LPS-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.
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



D11 = Manufacturer's Marking
 T4004LS = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 16 = 2016)
 WW = Week (01 to 53)

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	40	V
Gate-Source Voltage	V_{GSS}	± 20	V
Continuous Drain Current (Note 5)	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	26
Continuous Drain Current (Note 6)		I_D	21
Maximum Continuous Body Diode Forward Current (Note 6)	I_S	90	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)	I_{DM}	90	A
Avalanche Current, L=0.2mH	I_{AS}	100	A
Avalanche Energy, L=0.2mH	E_{AS}	33.3	A
		110	mJ

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	2.6	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	47	$^\circ\text{C}/\text{W}$
Total Power Dissipation (Note 6)	P_D	138	W
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	0.9	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	$V_{GS} = 0\text{V}, I_D = 1\text{mA}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 32\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	2.5	$\text{m}\Omega$	$V_{GS} = 10\text{V}, I_D = 50\text{A}$
Diode Forward Voltage		—	—	4		$V_{GS} = 4.5\text{V}, I_D = 50\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	4508	—	pF	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	1648	—		
Reverse Transfer Capacitance	C_{rss}	—	104	—		
Gate resistance	R_g	—	0.7	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ($V_{GS} = 4.5\text{V}$)	Q_g	—	34.6	—	nC	$V_{DD} = 20\text{V}, I_D = 30\text{A}$
Total Gate Charge ($V_{GS} = 10\text{V}$)	Q_g	—	82.2	—		
Gate-Source Charge	Q_{gs}	—	9.9	—		
Gate-Drain Charge	Q_{qd}	—	11.2	—		
Turn-On Delay Time	$t_{D(ON)}$	—	5.9	—	ns	$V_{DD} = 20\text{V}, V_{GS} = 10\text{V}, I_D = 30\text{A}, R_G = 1.6\Omega$
Turn-On Rise Time	t_R	—	13.3	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	25.9	—		
Turn-Off Fall Time	t_F	—	7.9	—		
Body Diode Reverse Recovery Time	t_{RR}	—	48.4	—	ns	$I_F = 50\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{RR}	—	72.4	—		

Notes:

5. Device mounted with exposed drain pad on 25mm by 25mm 2oz copper on a single- sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady state.
6. Thermal resistance from junction to soldering point (on the exposed drain pad).
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

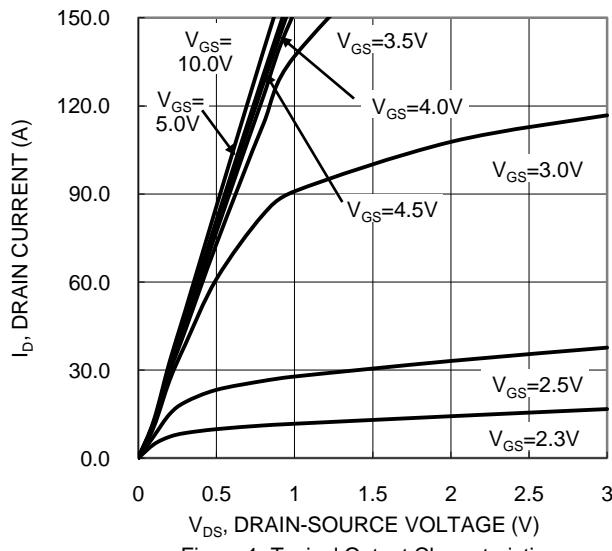


Figure 1. Typical Output Characteristic

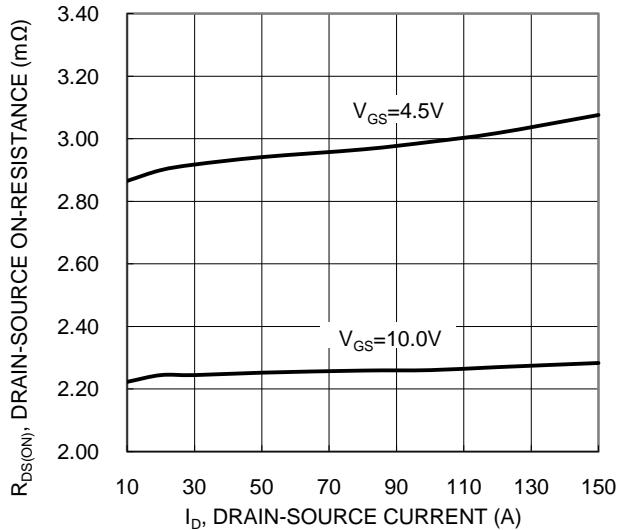


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

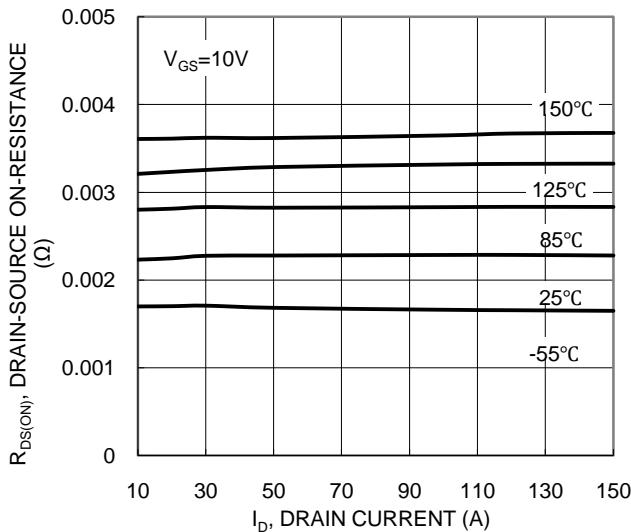


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

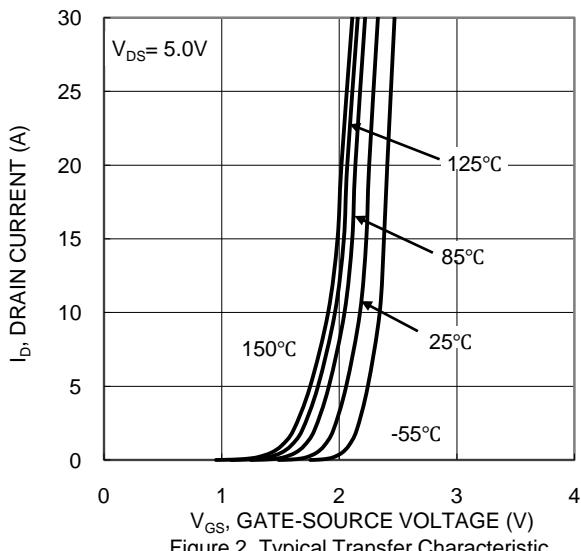


Figure 2. Typical Transfer Characteristic

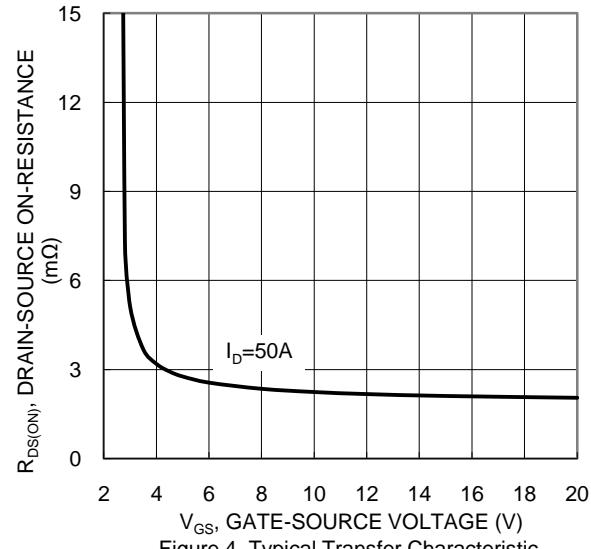


Figure 4. Typical Transfer Characteristic

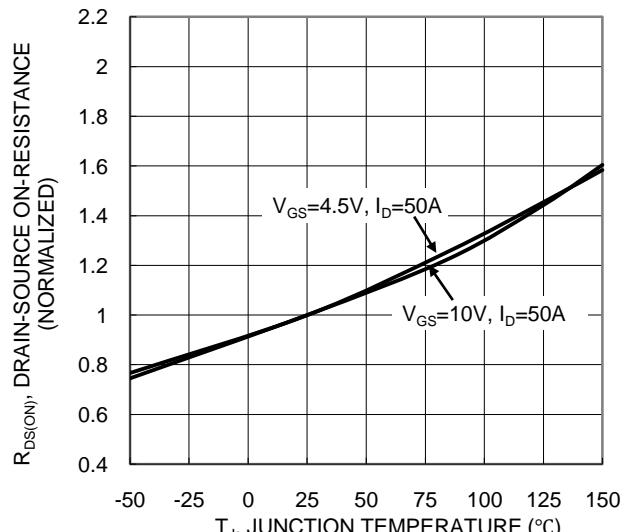
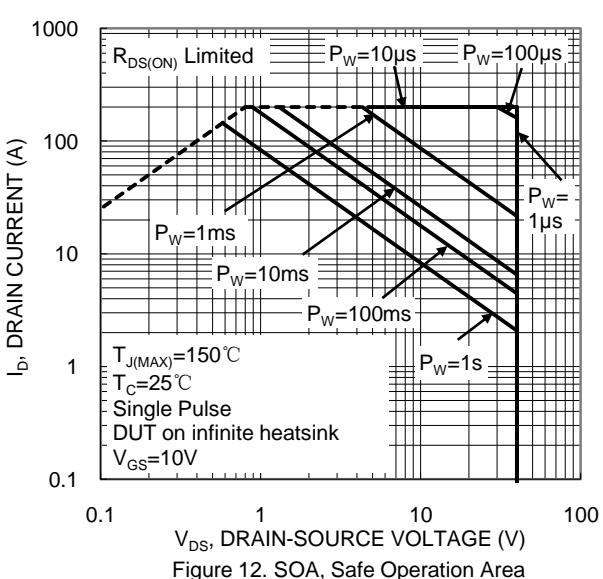
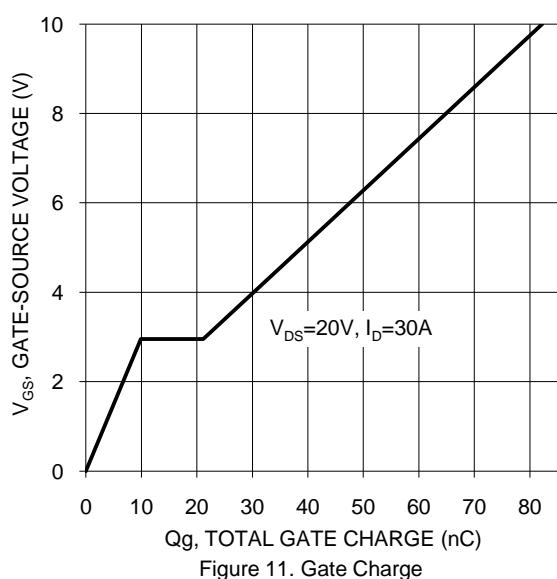
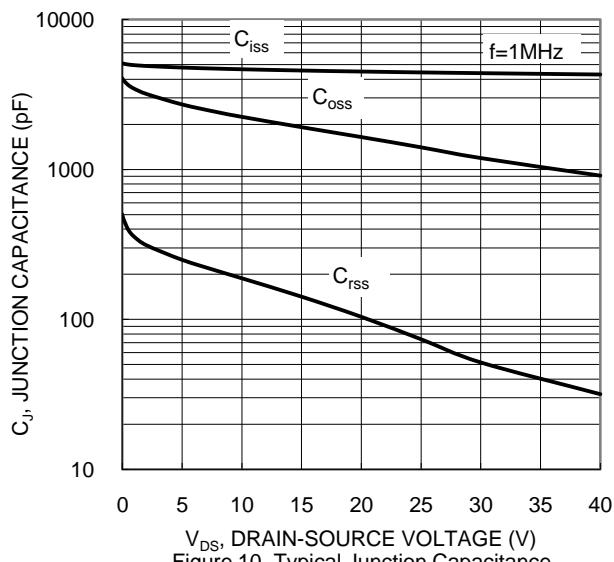
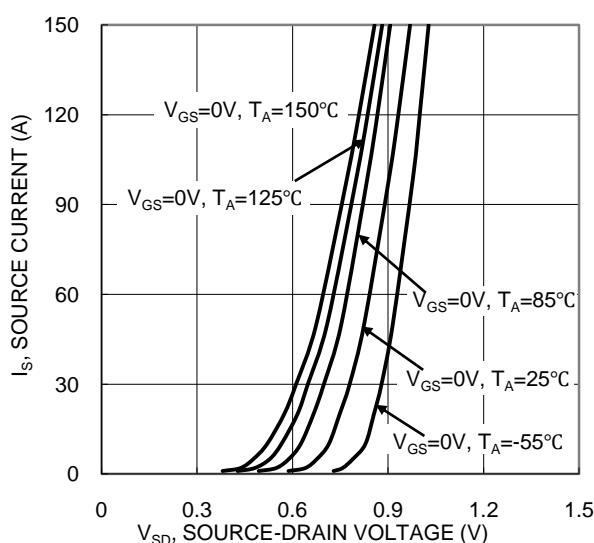
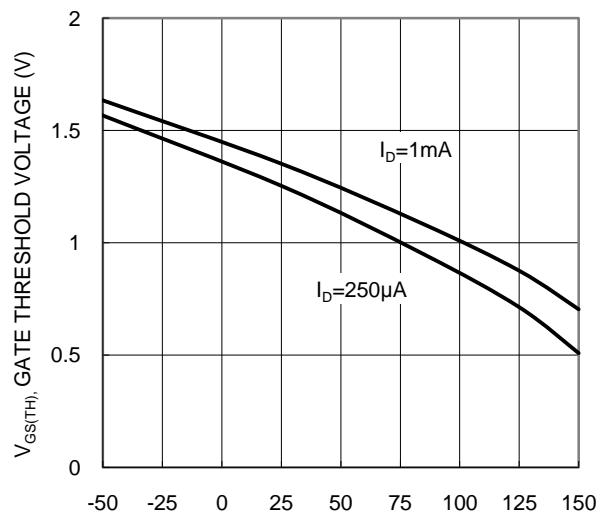
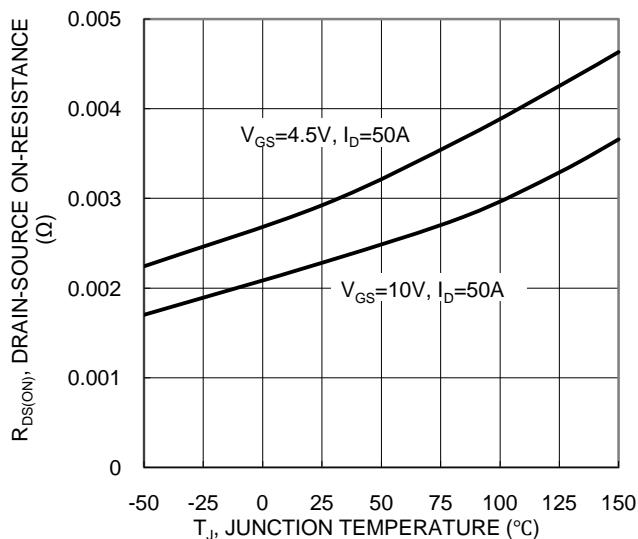


Figure 6. On-Resistance Variation with Temperature



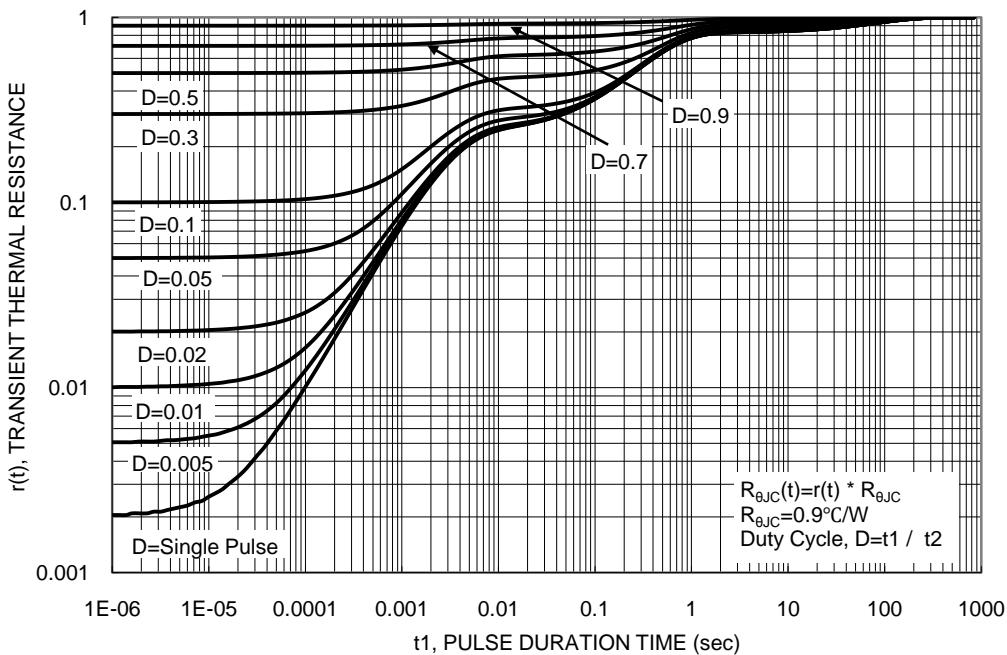
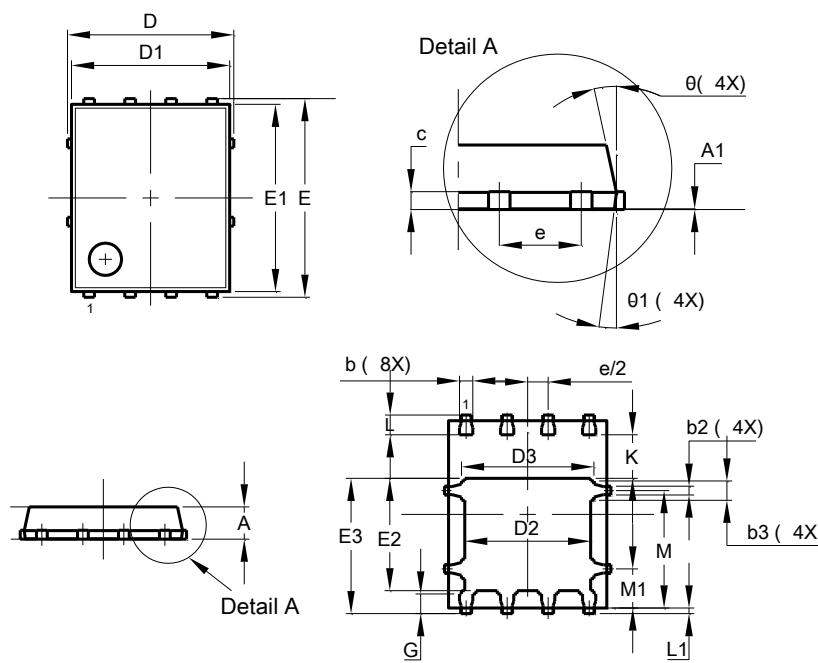


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

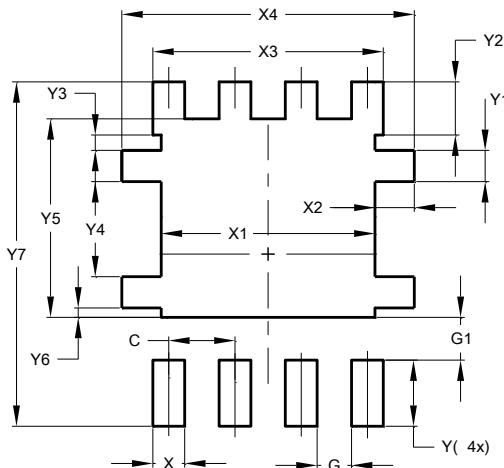
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



PowerDI5060-8			
Dim	Min	Max	Typ
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
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	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	3.635
M1	1.00	1.40	1.21
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.



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	4.100
X2	0.755
X3	4.420
X4	5.610
Y	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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