

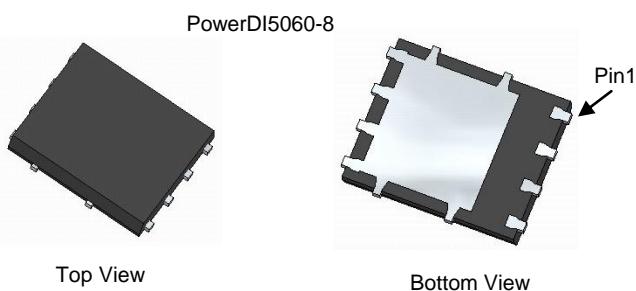
## Product Summary

$BV_{DSS}$	$R_{DS(ON)} \text{ Max}$	$I_D$ $T_C = +25^\circ\text{C}$
40V	6.5mΩ @ $V_{GS} = 10\text{V}$	100A
	9.8mΩ @ $V_{GS} = 4.5\text{V}$	80A

## Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Motor Control
- DC-DC Converters
- Loadswitch

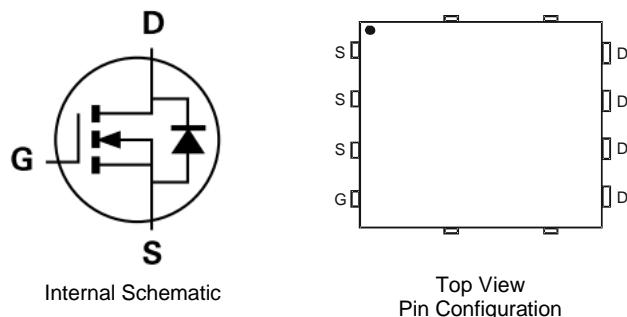


## Features

- Thermally Efficient Package – Cooler Running Applications
- High Conversion Efficiency
- Low  $R_{DS(ON)}$  – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed
- <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
- PPAP Capable (Note 4)

## 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 (E3)
- Weight: 0.097 grams (Approximate)



## Ordering Information (Note 5)

Part Number	Case	Packaging
DMTH4007LPSQ-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](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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



DII = Manufacturer's Marking  
H4007LS = Product Type Marking Code  
YYWW = Date Code Marking  
YY = Last Digit of Year (ex: 14 = 2014)  
WW = Week Code (01 to 53)

PowerDI is a registered trademark of Diodes Incorporated.

DMTH4007LPSQ  
Document number: DS37797 Rev.1 - 2

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

Characteristic	Symbol	Value	Units
Drain-Source Voltage	$V_{DSS}$	40	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 6)	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	15.5 13
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 7)	$T_C = +25^\circ\text{C}$ $T_C = +100^\circ\text{C}$	$I_D$	100 80
Maximum Continuous Body Diode Forward Current (Note 7)	$I_S$	100	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)	$I_{DM}$	160	A
Avalanche Current, $L = 0.1\text{mH}$	$I_{AS}$	20	A
Avalanche Energy, $L = 0.1\text{mH}$	$E_{AS}$	20	mJ

**Thermal Characteristics**

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 6)	$P_D$	2.7	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	55	°C/W
Total Power Dissipation (Note 7)	$P_D$	150	W
Thermal Resistance, Junction to Case (Note 7)	$R_{\theta JC}$	1	°C/W
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +175	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 8)						
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	$\mu\text{A}$	$V_{DS} = 32\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS</b> (Note 8)						
Gate Threshold Voltage	$V_{GS(\text{th})}$	1	—	3	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(\text{ON})}$	—	5.4	6.5	$\text{m}\Omega$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$
		—	8.4	9.8		$V_{GS} = 4.5\text{V}, I_D = 20\text{A}$
Diode Forward Voltage	$V_{SD}$	—	—	1.2	V	$V_{GS} = 0\text{V}, I_S = 20\text{A}$
<b>DYNAMIC CHARACTERISTICS</b> (Note 9)						
Input Capacitance	$C_{iss}$	—	1,895	—	pF	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance	$C_{oss}$	—	485	—		
Reverse Transfer Capacitance	$C_{rss}$	—	20.9	—		
Gate Resistance	$R_g$	0.1	0.62	1.8	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	—	12.4	—	nC	$V_{DS} = 30\text{V}, I_D = 20\text{A}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_g$	—	29.1	—		
Gate-Source Charge	$Q_{gs}$	—	5.9	—		
Gate-Drain Charge	$Q_{gd}$	—	3.5	—		
Turn-On Delay Time	$t_{D(\text{ON})}$	—	5.4	—	ns	$V_{DD} = 30\text{V}, V_{GS} = 10\text{V}, I_D = 20\text{A}, R_G = 3\Omega$
Turn-On Rise Time	$t_R$	—	4.5	—		
Turn-Off Delay Time	$t_{D(\text{OFF})}$	—	16.2	—		
Turn-Off Fall Time	$t_F$	—	3.5	—		
Body Diode Reverse Recovery Time	$t_{RR}$	—	30.6	—	ns	$IF = 20\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	$Q_{RR}$	—	28.1	—		

Notes:

6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch 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.

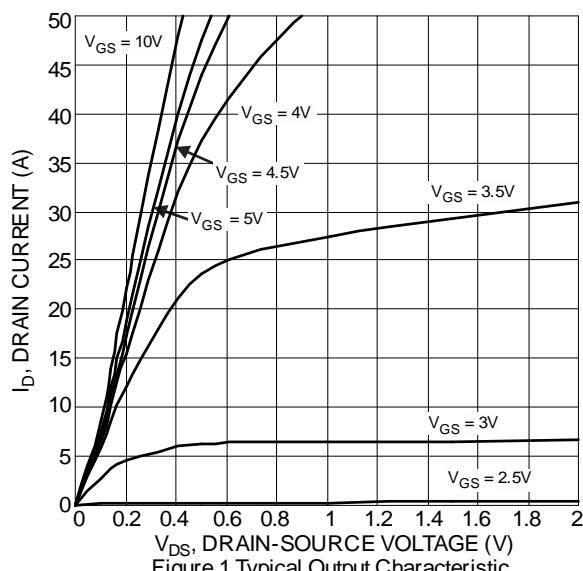


Figure 1 Typical Output Characteristic

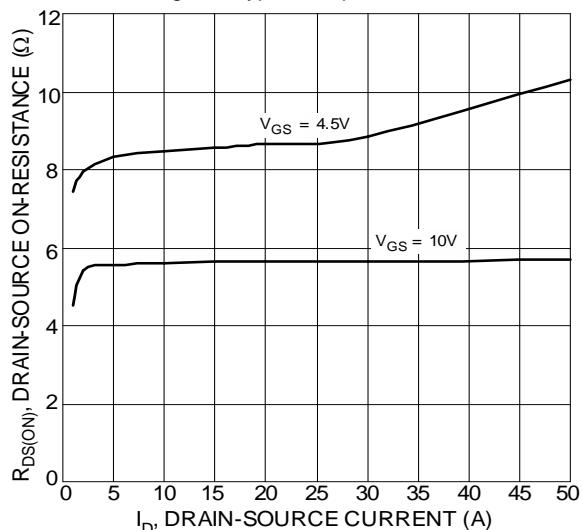


Figure 3 Typical On-Resistance vs.  
Drain Current and Gate Voltage

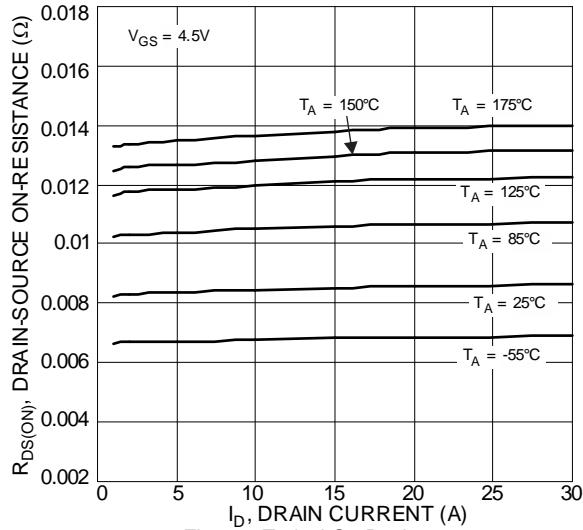


Figure 5 Typical On-Resistance vs.  
Drain Current and Temperature

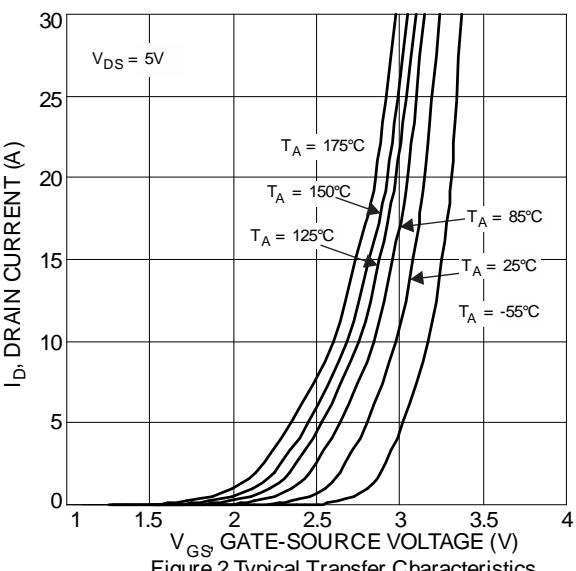


Figure 2 Typical Transfer Characteristics

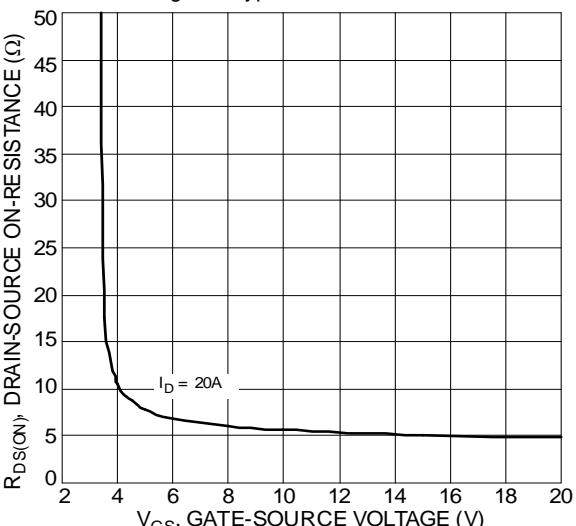


Figure 4 Typical Drain-Source On-Resistance  
vs. Gate-Source Voltage

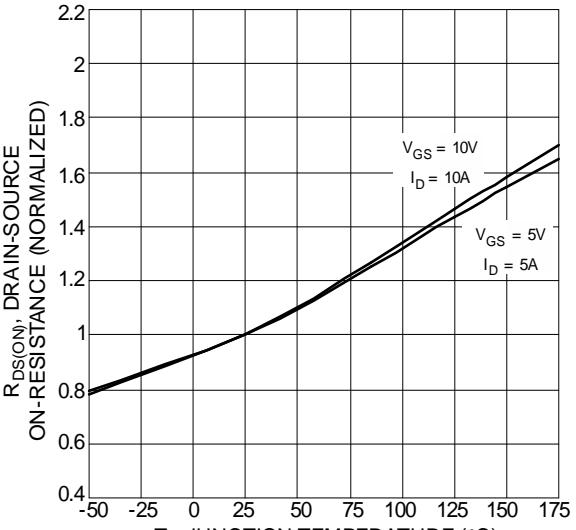
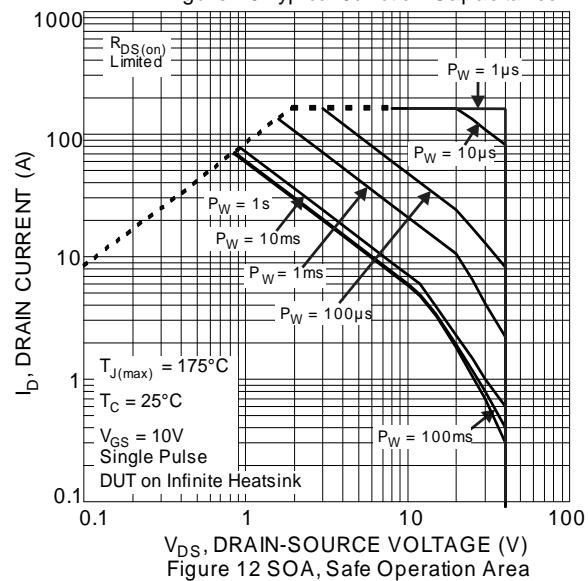
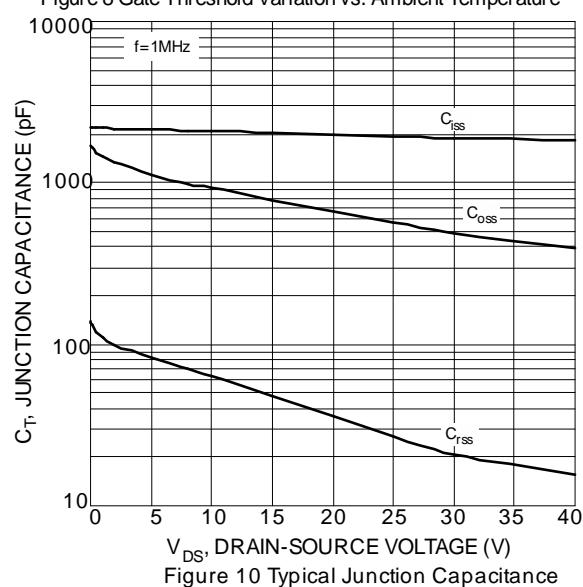
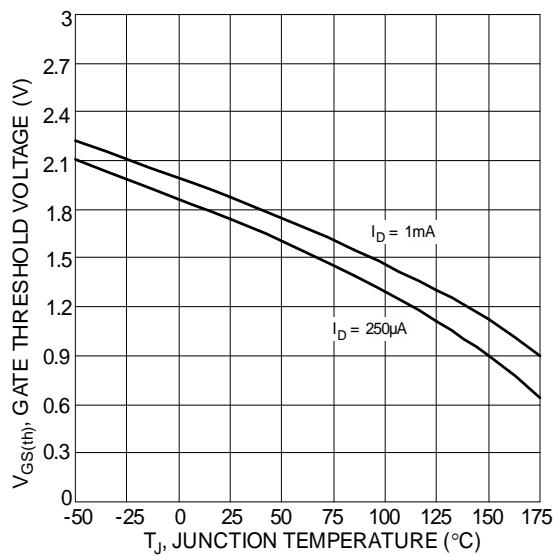
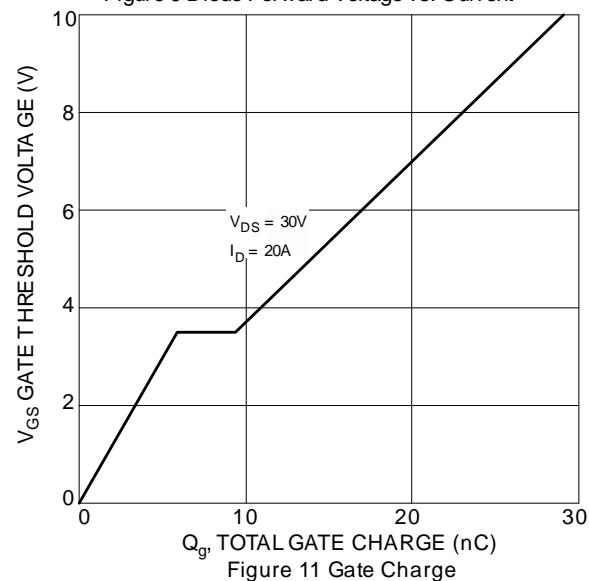
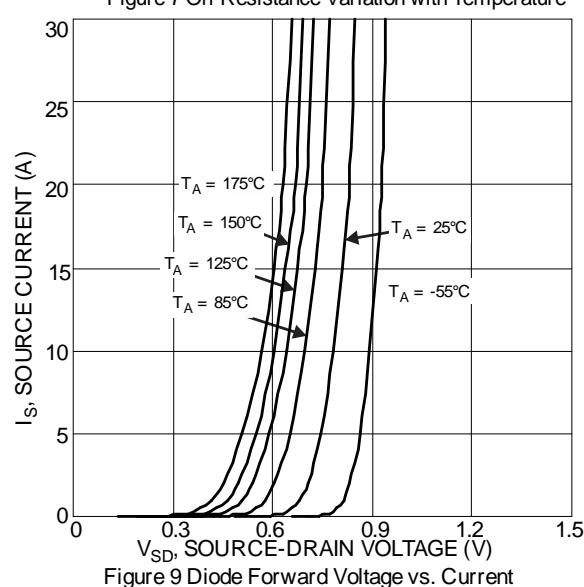
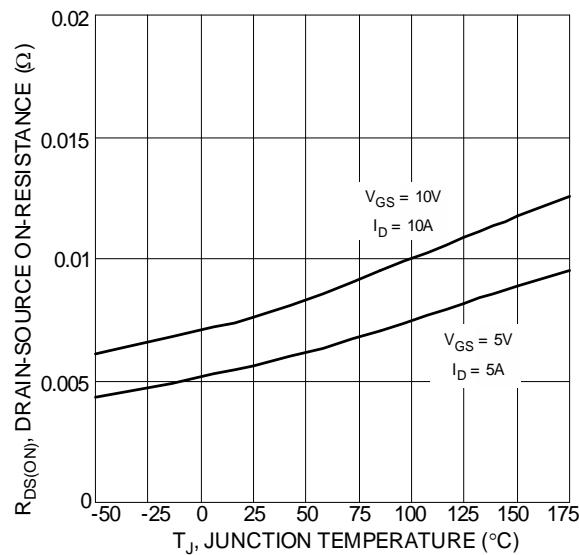


Figure 6 On-Resistance Variation with Temperature



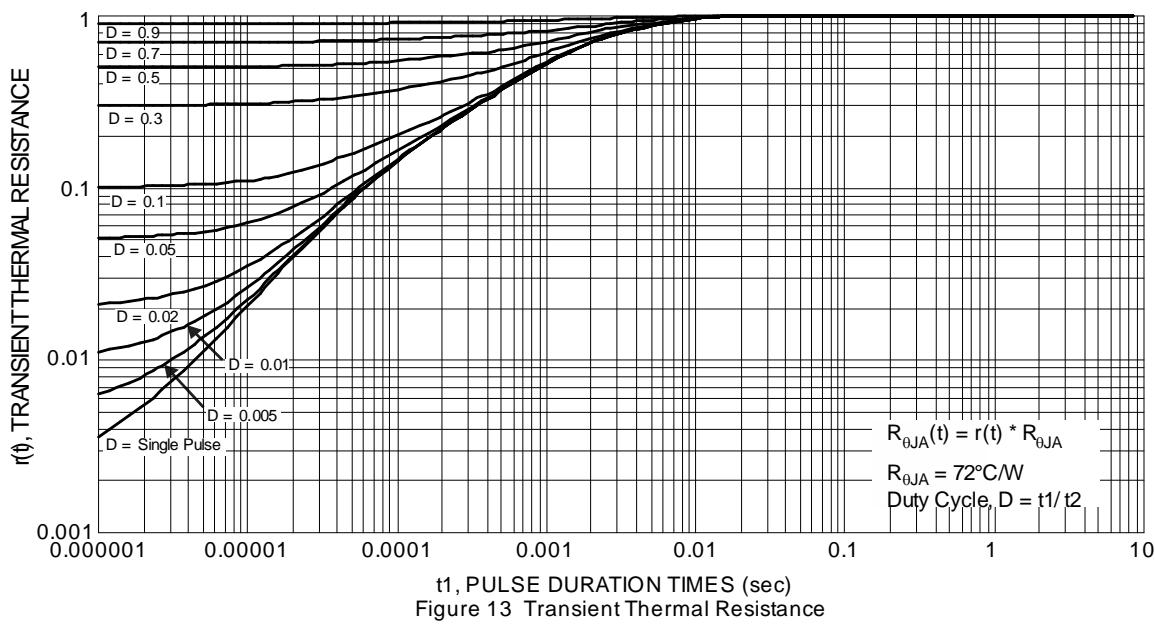
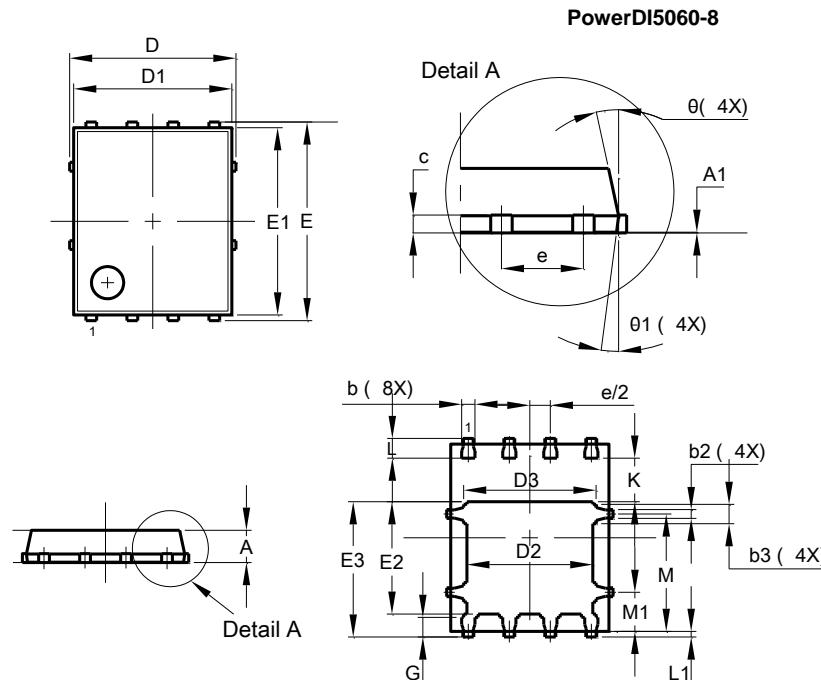


Figure 13 Transient Thermal Resistance

## Package Outline

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

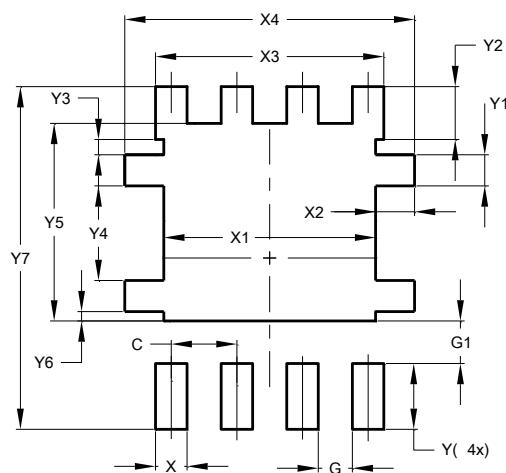


PowerDI5060-8			
Dim	Min	Max	Typ
<b>A</b>	0.90	1.10	1.00
<b>A1</b>	0.00	0.05	—
<b>b</b>	0.33	0.51	0.41
<b>b2</b>	0.200	0.350	0.273
<b>b3</b>	0.40	0.80	0.60
<b>c</b>	0.230	0.330	0.277
<b>D</b>	5.15 BSC		
<b>D1</b>	4.70	5.10	4.90
<b>D2</b>	3.70	4.10	3.90
<b>D3</b>	3.90	4.30	4.10
<b>E</b>	6.15 BSC		
<b>E1</b>	5.60	6.00	5.80
<b>E2</b>	3.28	3.68	3.48
<b>E3</b>	3.99	4.39	4.19
<b>e</b>	1.27 BSC		
<b>G</b>	0.51	0.71	0.61
<b>K</b>	0.51	—	—
<b>L</b>	0.51	0.71	0.61
<b>L1</b>	0.100	0.200	0.175
<b>M</b>	3.235	4.035	3.635
<b>M1</b>	1.00	1.40	1.21
<b>θ</b>	10°	12°	11°
<b>θ1</b>	6°	8°	7°
All Dimensions in mm			

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

**PowerDI5060-8**



Dimensions	Value (in mm)
<b>C</b>	1.270
<b>G</b>	0.660
<b>G1</b>	0.820
<b>X</b>	0.610
<b>X1</b>	4.100
<b>X2</b>	0.755
<b>X3</b>	4.420
<b>X4</b>	5.610
<b>Y</b>	1.270
<b>Y1</b>	0.600
<b>Y2</b>	1.020
<b>Y3</b>	0.295
<b>Y4</b>	1.825
<b>Y5</b>	3.810
<b>Y6</b>	0.180
<b>Y7</b>	6.610

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