

**Product Summary**

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	Q <sub>g</sub> Typ	I <sub>D</sub> T <sub>C</sub> = +25°C (Note 9)
40V	2.7mΩ @ V <sub>GS</sub> = 10V	68.6nC	100A

**Description**

This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>), yet maintain superior switching performance, making it ideal for high efficiency power management applications.

**Applications**

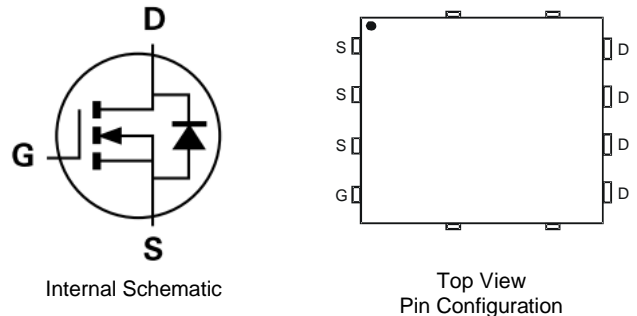
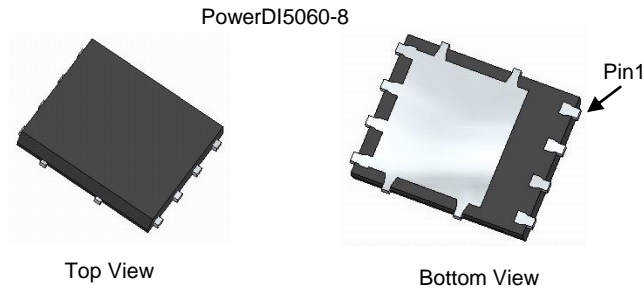
- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

**Features**

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching Ensures More Reliable and Robust End Application
- Low R<sub>DS(ON)</sub> – Minimizes Power Losses
- Low Q<sub>g</sub> – 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: 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
- Weight: 0.097 grams (Approximate)

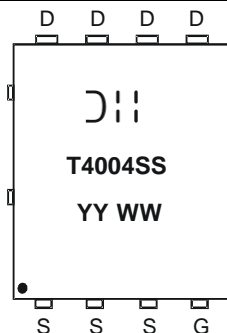


**Ordering Information** (Note 4)

Part Number	Case	Packaging
DMTH4004SPS-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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



= Manufacturer's Marking  
 T4004SS = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 14 = 2014)  
 WW = Week (01 - 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	40	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 5)	I <sub>D</sub>	T <sub>A</sub> = +25°C	31
		T <sub>A</sub> = +70°C	26
Continuous Drain Current (Note 6)	I <sub>D</sub>	T <sub>C</sub> = +25°C (Note 9)	100
		T <sub>C</sub> = +100°C	100
Maximum Continuous Body Diode Forward Current (Note 5)	I <sub>S</sub>	100	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	200	A
Avalanche Current, L=0.2mH	I <sub>AS</sub>	45	A
Avalanche Energy, L=0.2mH	E <sub>AS</sub>	200	mJ

**Thermal Characteristics**

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	3.6	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	41	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	167	W
Thermal Resistance, Junction to Case (Note 6)	R <sub>θJC</sub>	0.9	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 7)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	40	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 32V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 7)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	2	—	4	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	2.3	2.7	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 90A
Diode Forward Voltage	V <sub>SD</sub>	—	0.9	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A
<b>DYNAMIC CHARACTERISTICS</b> (Note 8)						
Input Capacitance	C <sub>iss</sub>	—	4,305	—	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	1,441	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	102	—		
Gate Resistance	R <sub>g</sub>	—	0.77	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge	Q <sub>g</sub>	—	68.6	—	nC	V <sub>DD</sub> = 20V, I <sub>D</sub> = 90A, V <sub>GS</sub> = 10V
Gate-Source Charge	Q <sub>gs</sub>	—	16.8	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	14.2	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	9.5	—	ns	V <sub>DD</sub> = 20V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 90A, R <sub>G</sub> = 3.5Ω
Turn-On Rise Time	t <sub>r</sub>	—	6.7	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	26.4	—		
Turn-Off Fall Time	t <sub>f</sub>	—	8.1	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	52.4	—	ns	I <sub>F</sub> = 50A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	78.2	—	nC	

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
  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.
  9. Package limited.

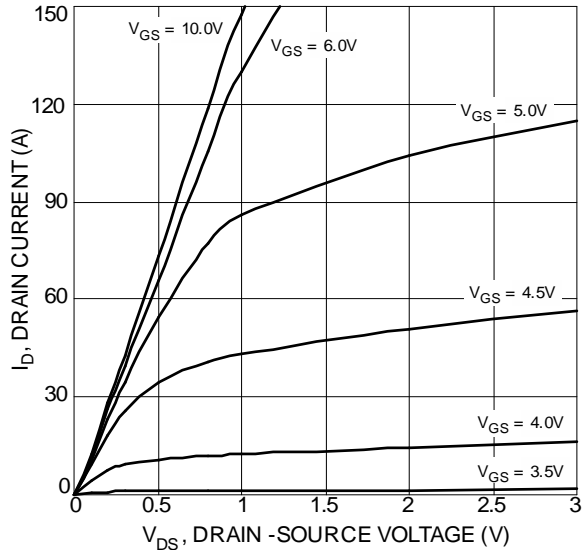


Figure 1 Typical Output Characteristics

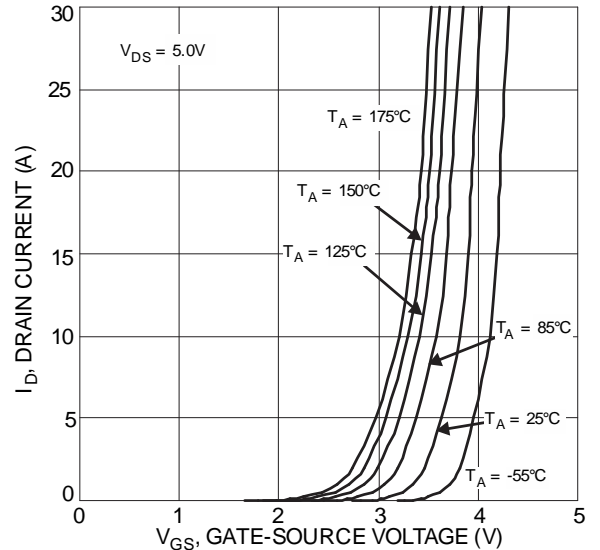


Figure 2 Typical Transfer Characteristics

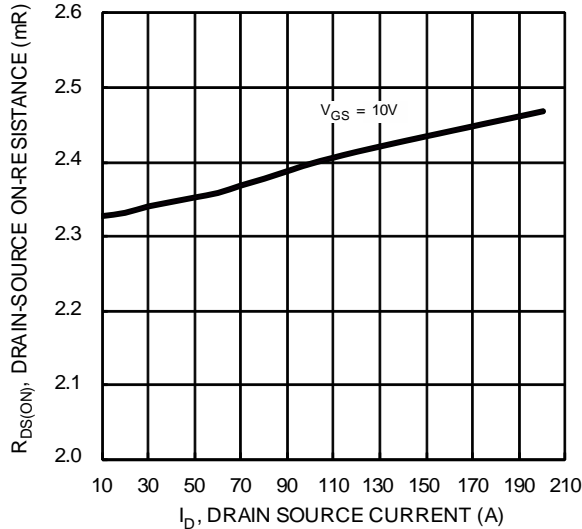


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

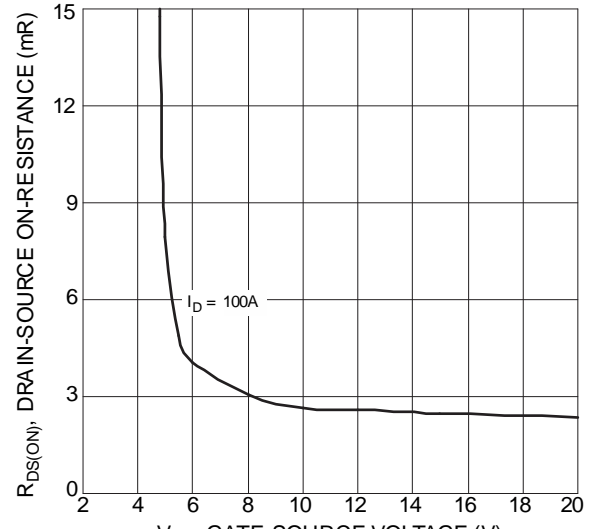


Figure 4 Typical Transfer Characteristics

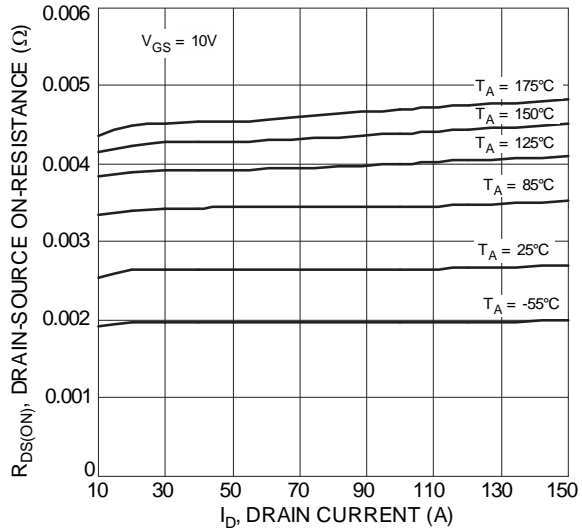


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

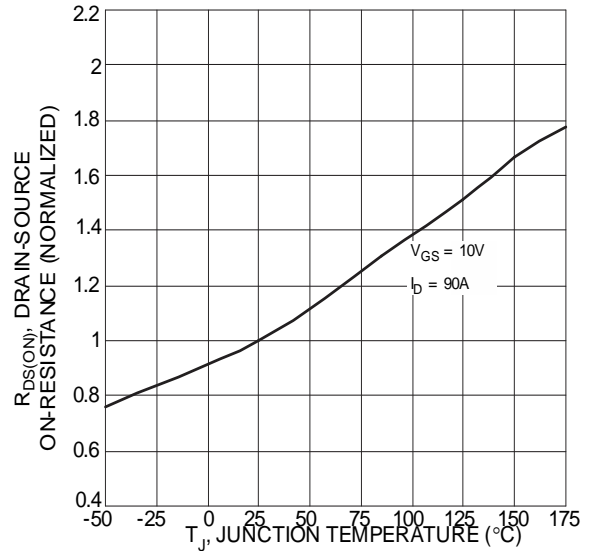


Figure 6 On-Resistance Variation with Temperature

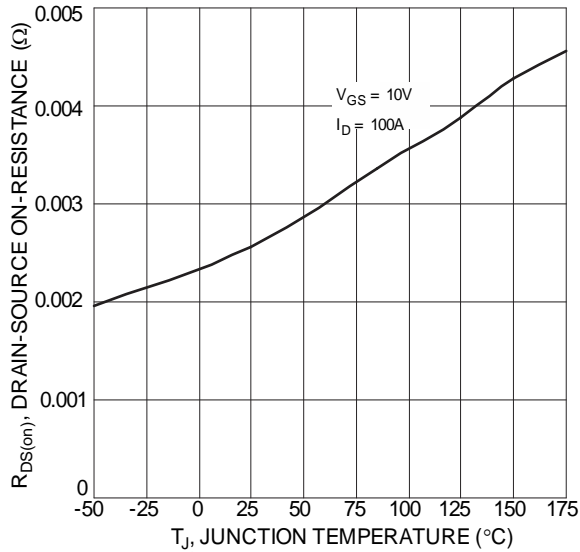


Figure 7 On-Resistance Variation with Temperature

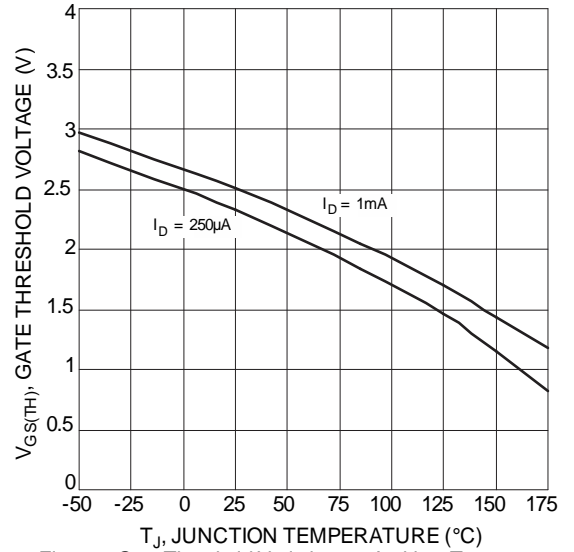


Figure 8 Gate Threshold Variation vs. Ambient Temperature

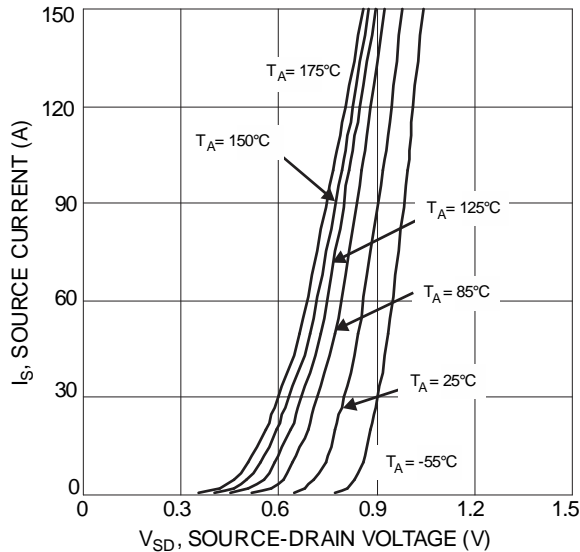


Figure 9 Diode Forward Voltage vs. Current

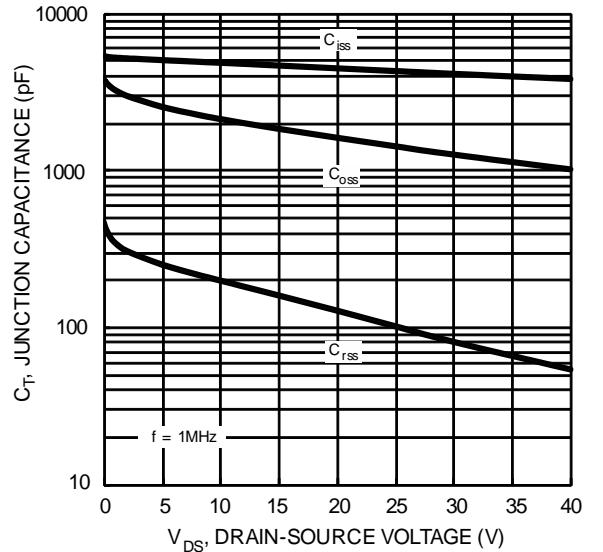


Figure 10 Typical Junction Capacitance

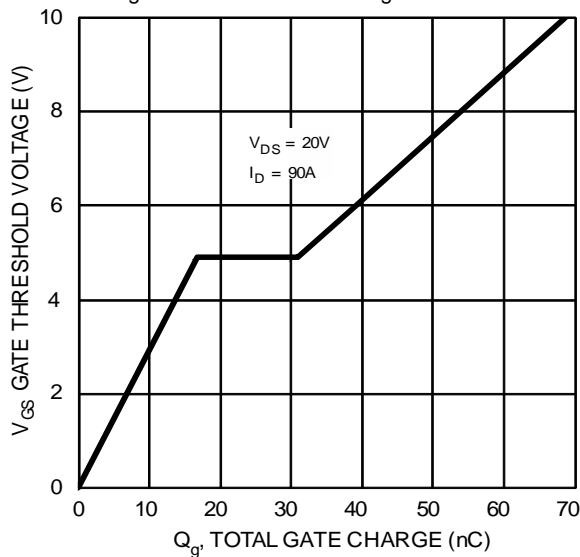


Figure 11 Gate Charge

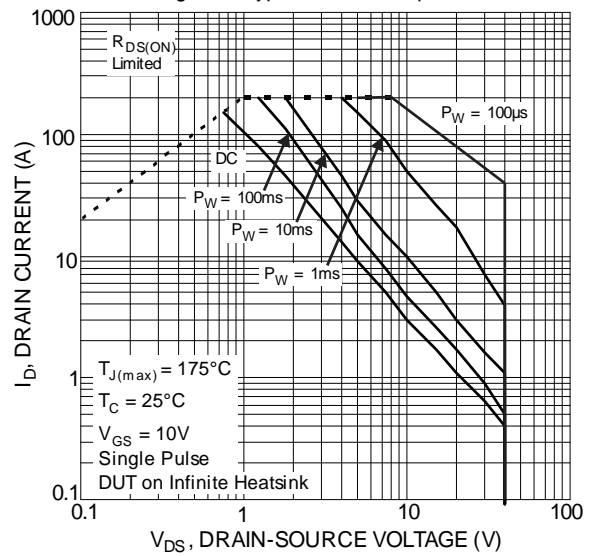


Figure 12 SOA, Safe Operation Area

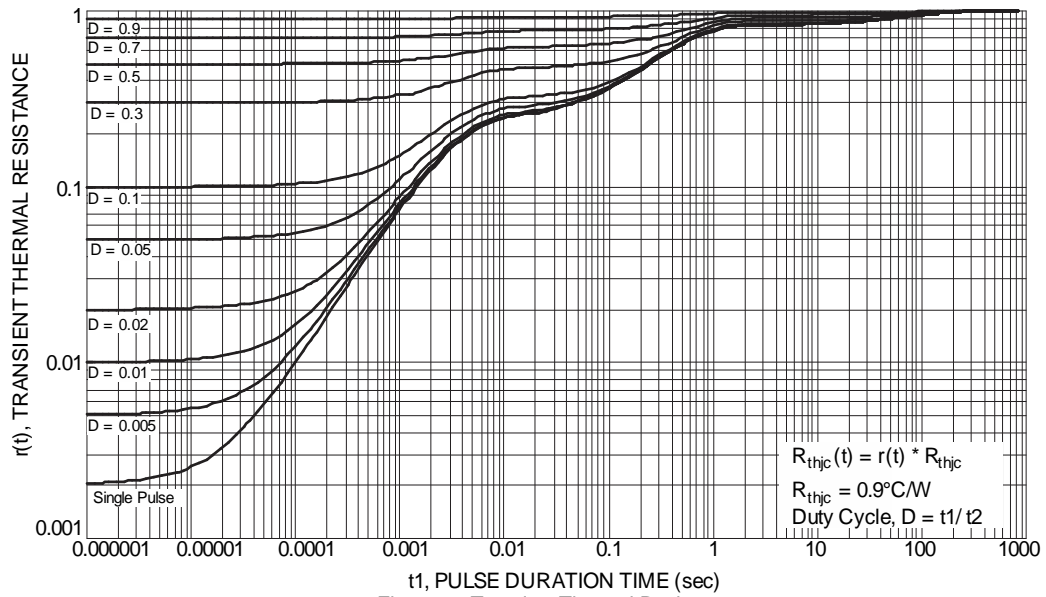
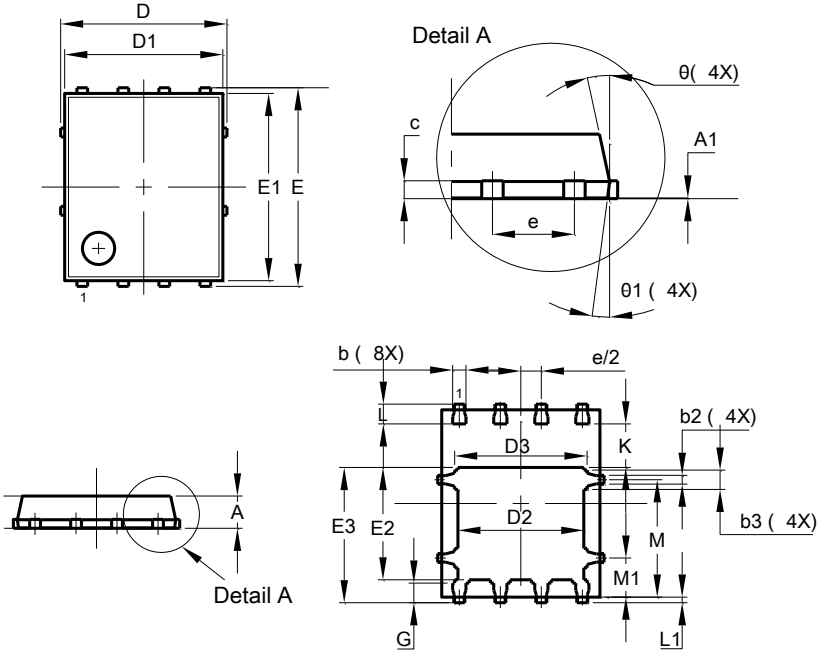


Figure 13 Transient Thermal Resistance

**Package Outline**

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

**PowerDI5060-8**

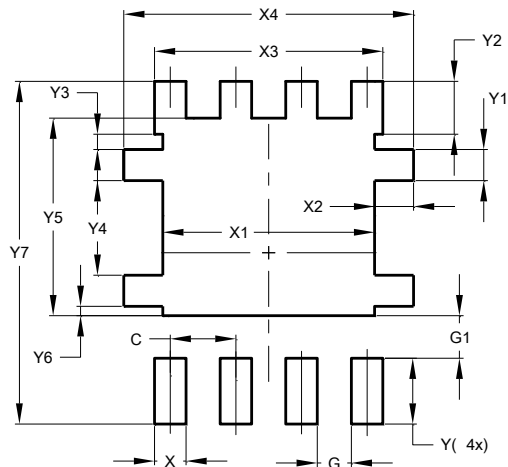


PowerDI5060-8			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	-
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61
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
theta	10°	12°	11°
theta1	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)
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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