

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max      | I <sub>D</sub><br>T <sub>C</sub> = +25°C |
|-------------------|------------------------------|------------------------------------------|
| 100V              | 16mΩ @ V <sub>GS</sub> = 10V | 44A                                      |
|                   | 18mΩ @ V <sub>GS</sub> = 6V  | 41A                                      |

## Description

This new generation N-Channel Enhancement Mode MOSFET is designed to minimize R<sub>DS(ON)</sub>, yet maintain superior switching performance. This device is ideal for use in notebook battery power management and loadswitch.

## Applications

- Motor Control
- DC-DC Converters
- Power Management

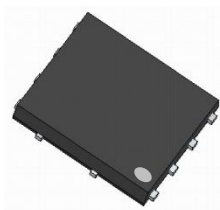
## Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- High Conversion Efficiency
- Low R<sub>DS(ON)</sub> – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability**

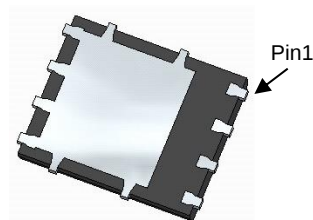
## Mechanical Data

- 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 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)

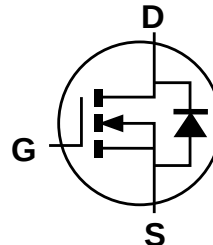
PowerDI5060-8



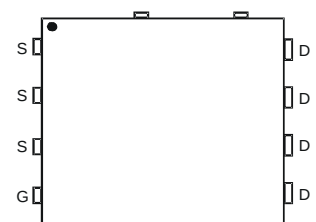
Top View



Bottom View



Internal Schematic



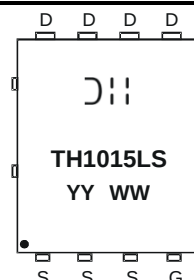
Top View  
Pin Configuration

## Ordering Information (Note 4)

| Part Number      | Case          | Packaging         |
|------------------|---------------|-------------------|
| DMTH10H015LPS-13 | PowerDI5060-8 | 2,500/Tape & Reel |

- Notes:
- 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](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.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



☺ = Manufacturer's Marking  
 TH1015LS = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Digit of Year (ex: 16 = 2016)  
 WW = Week Code (01 to 53)

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

| Characteristic                                          |              |                                                   | Symbol           | Value      | Unit |
|---------------------------------------------------------|--------------|---------------------------------------------------|------------------|------------|------|
| Drain-Source Voltage                                    |              |                                                   | V <sub>DSS</sub> | 100        | V    |
| Gate-Source Voltage                                     |              |                                                   | V <sub>GSS</sub> | ±20        | V    |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C  | I <sub>D</sub>   | 7.3<br>5.8 | A    |
|                                                         | Steady State | T <sub>C</sub> = +25°C<br>T <sub>C</sub> = +100°C | I <sub>D</sub>   | 44<br>28   | A    |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)      |              |                                                   | I <sub>DM</sub>  | 120        | A    |
| Maximum Continuous Body Diode Forward Current (Note 5)  |              |                                                   | I <sub>S</sub>   | 1.5        | A    |
| Avalanche Current (Note 7) L=3mH                        |              |                                                   | I <sub>AS</sub>  | 7.5        | A    |
| Avalanche Energy (Note 7) L=3mH                         |              |                                                   | E <sub>AS</sub>  | 85         | mJ   |

**Thermal Characteristics**

| Characteristic                                   |                        | Symbol                            | Value       | Unit |
|--------------------------------------------------|------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 1.3         | W    |
| Thermal Resistance, Junction to Ambient (Note 5) |                        | R <sub>θJA</sub>                  | 98          | °C/W |
| Total Power Dissipation                          | T <sub>C</sub> = +25°C | P <sub>D</sub>                    | 46          | W    |
| Thermal Resistance, Junction to Case             |                        | R <sub>θJC</sub>                  | 2.7         | °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 6)     |                     |     |       |      |      |                                                                                            |
| Drain-Source Breakdown Voltage          | BV <sub>DSS</sub>   | 100 | —     | —    | 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> = 80V, 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 6)      |                     |     |       |      |      |                                                                                            |
| Gate Threshold Voltage                  | V <sub>GS(TH)</sub> | 1.4 | 2     | 3    | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                                 |
| Static Drain-Source On-Resistance       | R <sub>DS(ON)</sub> | —   | 11    | 16   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                                |
|                                         |                     | —   | 13.5  | 18   |      | V <sub>GS</sub> = 6V, I <sub>D</sub> = 20A                                                 |
|                                         |                     | —   | 18.4  | 25   |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5A                                                |
| Diode Forward Voltage                   | V <sub>SD</sub>     | —   | 0.9   | 1.3  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A                                                 |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 7) |                     |     |       |      |      |                                                                                            |
| Input Capacitance                       | C <sub>ISS</sub>    | —   | 1,871 | —    | pF   | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V<br>f = 1MHz                                    |
| Output Capacitance                      | C <sub>OSS</sub>    | —   | 261   | —    |      |                                                                                            |
| Reverse Transfer Capacitance            | C <sub>RSS</sub>    | —   | 7     | —    |      |                                                                                            |
| Gate Resistance                         | R <sub>G</sub>      | —   | 0.75  | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                       |
| Total Gate Charge                       | Q <sub>G</sub>      | —   | 33.3  | —    | nC   | V <sub>DD</sub> = 50V, I <sub>D</sub> = 10A,<br>V <sub>GS</sub> = 10V                      |
| Gate-Source Charge                      | Q <sub>GS</sub>     | —   | 6.9   | —    |      |                                                                                            |
| Gate-Drain Charge                       | Q <sub>GD</sub>     | —   | 5.1   | —    |      |                                                                                            |
| Turn-On Delay Time                      | t <sub>D(ON)</sub>  | —   | 6.5   | —    | ns   | V <sub>DD</sub> = 50V, V <sub>GS</sub> = 10V,<br>I <sub>D</sub> = 10A, R <sub>G</sub> = 6Ω |
| Turn-On Rise Time                       | t <sub>R</sub>      | —   | 7     | —    |      |                                                                                            |
| Turn-Off Delay Time                     | t <sub>D(OFF)</sub> | —   | 19.7  | —    |      |                                                                                            |
| Turn-Off Fall Time                      | t <sub>F</sub>      | —   | 8.1   | —    | ns   | I <sub>F</sub> = 10A, di/dt = 100A/µs                                                      |
| Reverse Recovery Time                   | t <sub>RR</sub>     | —   | 37.9  | —    |      |                                                                                            |
| Reverse Recovery Charge                 | Q <sub>RR</sub>     | —   | 51.9  | —    | nC   |                                                                                            |

Notes: 5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.  
6. Short duration pulse test used to minimize self-heating effect.  
7. Guaranteed by design. Not subject to product testing.

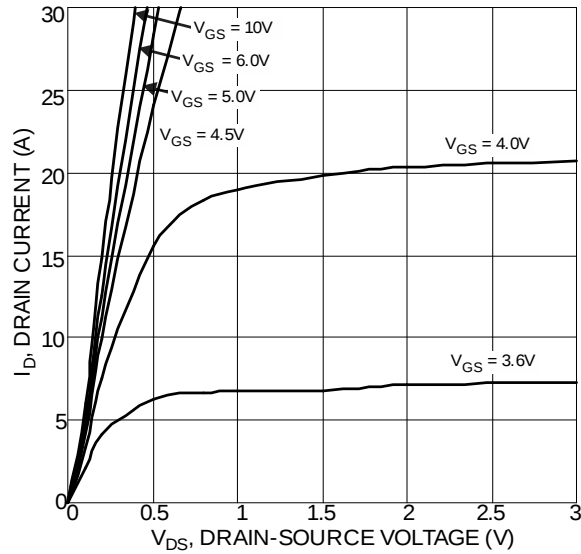


Figure 1 Typical Output Characteristic

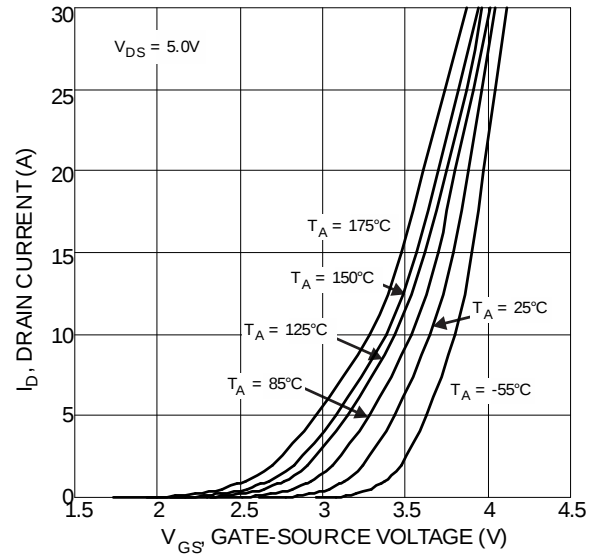


Figure 2 Typical Transfer Characteristics

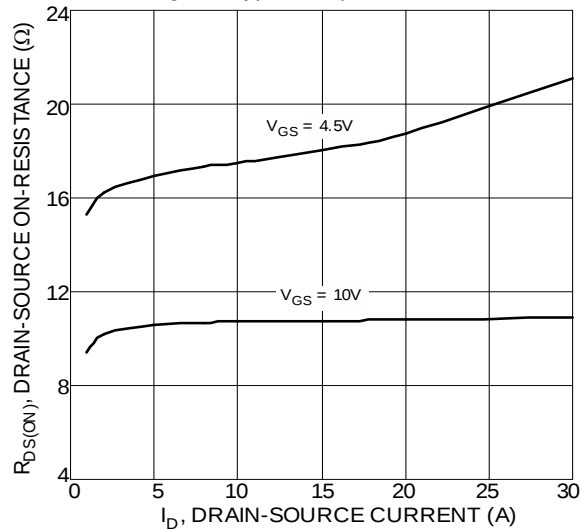


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

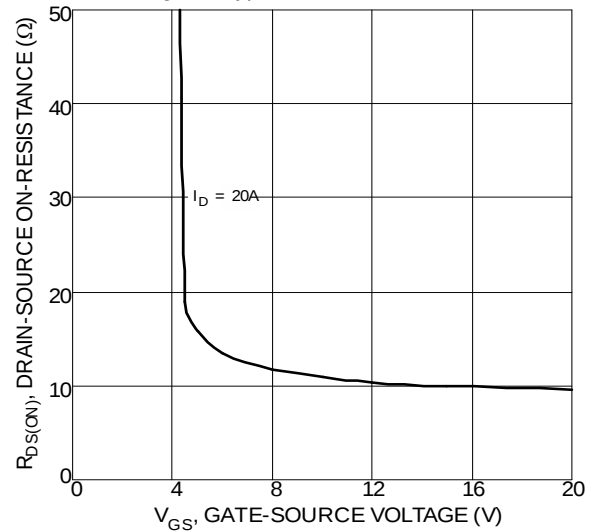


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

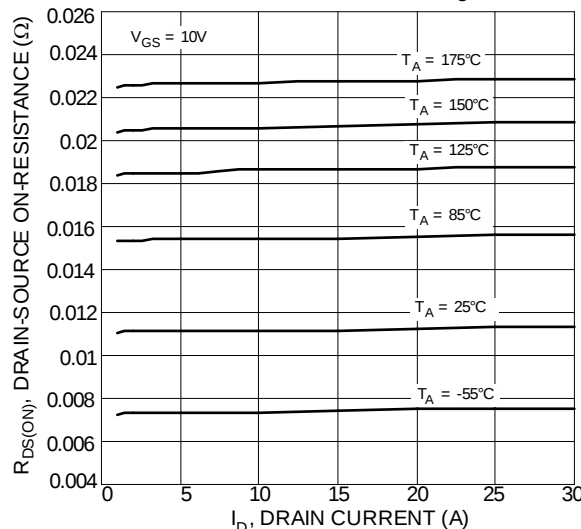


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

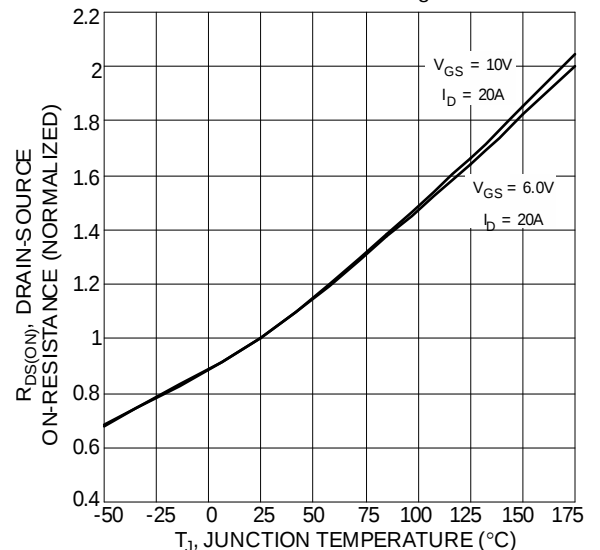
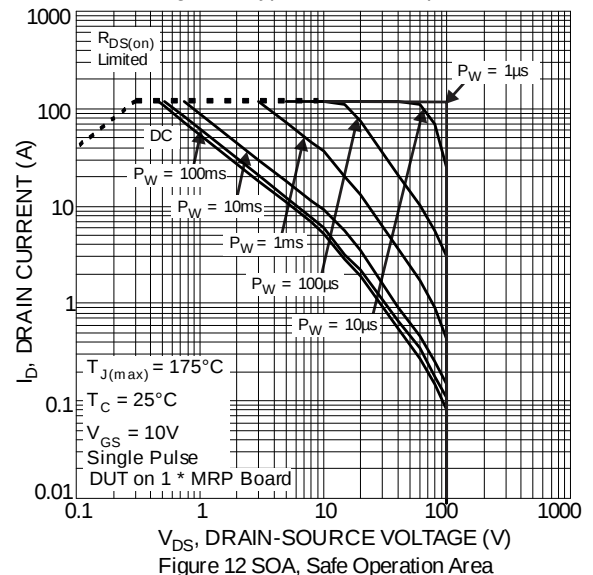
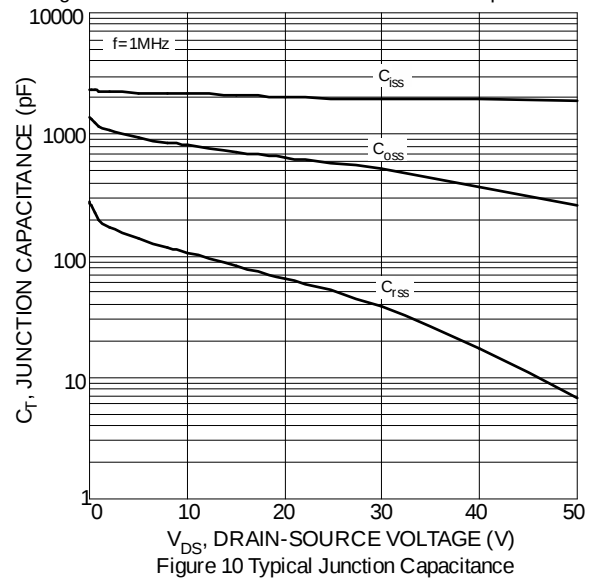
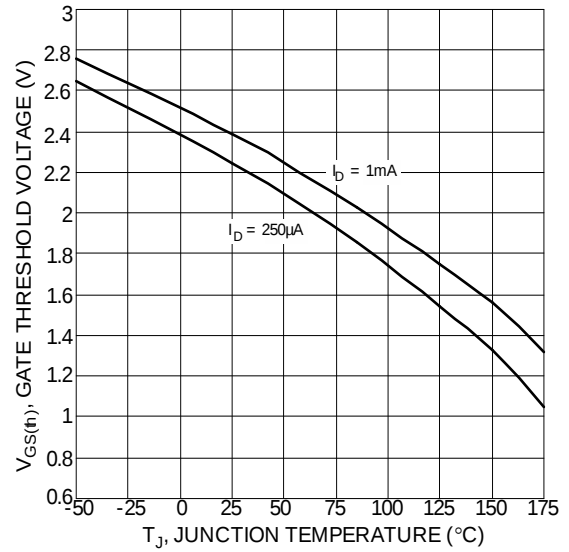
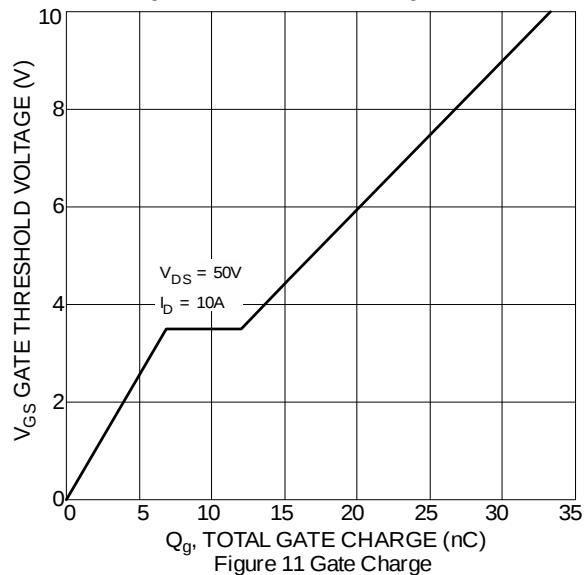
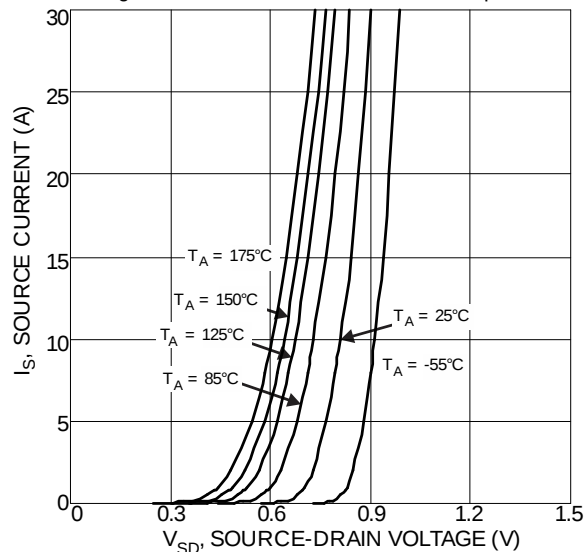
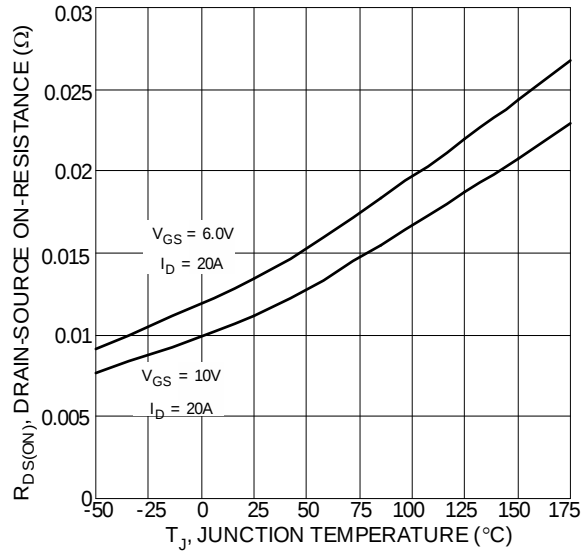
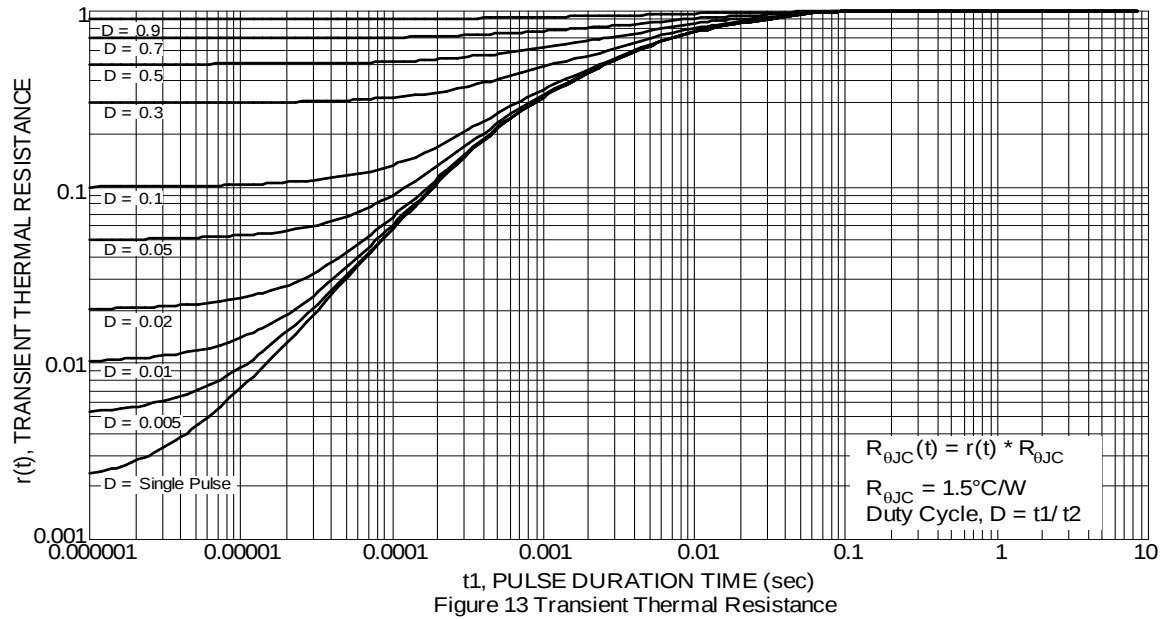


Figure 6 On-Resistance Variation with Temperature

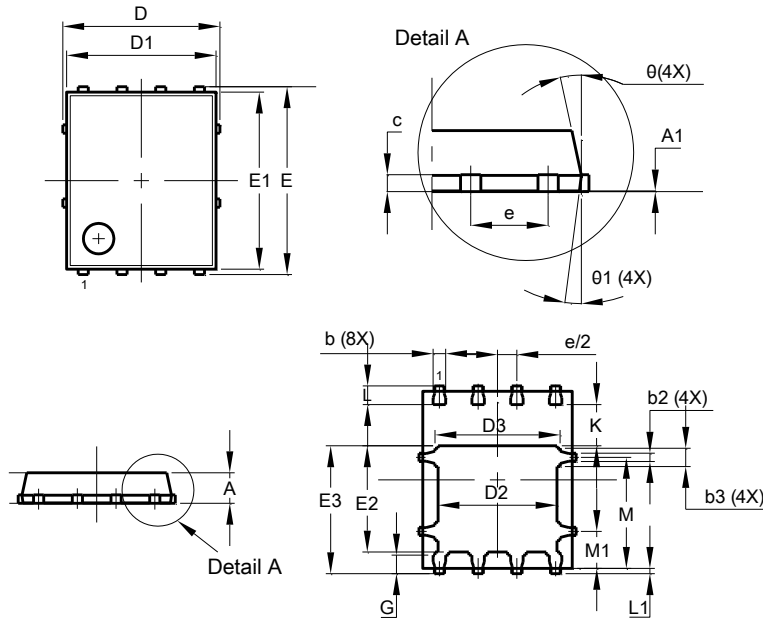




## Package Outline Dimensions

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

PowerDI5060-8

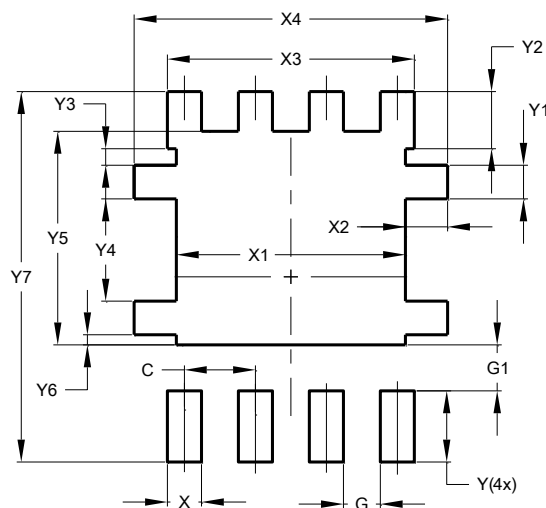


| PowerDI5060-8        |          |       |       |
|----------------------|----------|-------|-------|
| Dim                  | Min      | Max   | Typ   |
| A                    | 0.90     | 1.10  | 1.00  |
| A1                   | 0.00     | 0.05  | —     |
| b                    | 0.33     | 0.51  | 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  |
| 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



| 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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