

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub>           | I <sub>D</sub><br>T <sub>C</sub> = +25°C |
|-------------------|-------------------------------|--|
| 60V               | 14mΩ @ V <sub>GS</sub> = 10V  | 40A                                      |
|                   | 22mΩ @ V <sub>GS</sub> = 4.5V | 33A                                      |

## Features

- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable and Robust End Application
- Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low R<sub>DS(ON)</sub> – Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed
- Wettable Flank for Improved Optical Inspection
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact_us) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

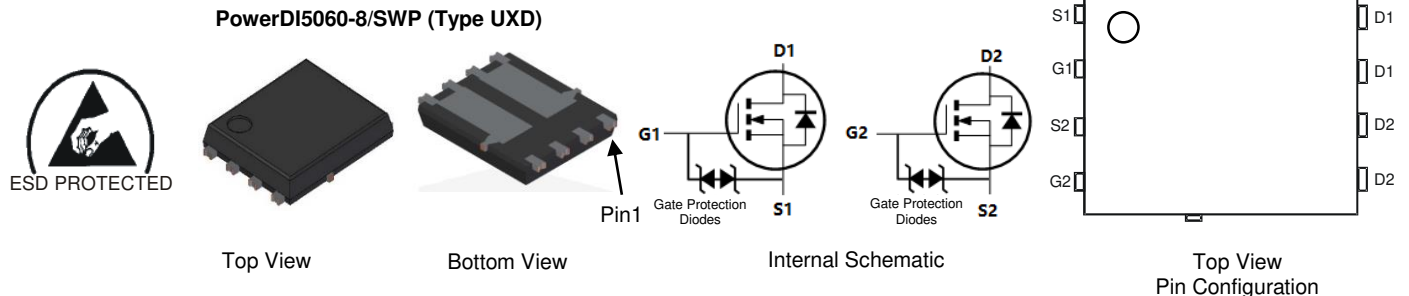
## Description and Applications

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.

- Wireless Charging
- DC-DC Converters
- Power Management

## Mechanical Data

- Case: PowerDI<sup>®</sup>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 (Ⓜ3)
- Weight: 0.097 grams (Approximate)



## Ordering Information (Note 4)

| Part Number    | Case                         | Packaging         |
|----------------|------------------------------|-------------------|
| DMT6011LPDW-13 | PowerDI5060-8/SWP (Type UXD) | 2,500/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



= Manufacturer's Marking  
 T6011LDW = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 21 = 2021)  
 WW = Week Code (01 to 53)

PowerDI is a registered trademark of Diodes Incorporated.

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

| Characteristic  |                        | Symbol           | Value                  | Unit |
|---|------------------------|------------------|------------------------|------|
| Drain-Source Voltage  |                        | V <sub>DSS</sub> | 60                     | V    |
| Gate-Source Voltage   |                        | V <sub>GSS</sub> | ±20                    | V    |
| Continuous Drain Current, V <sub>GS</sub> = 10V (Note 6)        | T <sub>C</sub> = +25°C | I <sub>D</sub>   | 40                     | A    |
|   | T <sub>C</sub> = +70°C |                  | 32                     |      |
| Continuous Drain Current, V <sub>GS</sub> = 10V (Note 5)        | Steady State           | I <sub>D</sub>   | T <sub>A</sub> = +25°C | 10.3 |
|   |                        |                  | T <sub>A</sub> = +70°C | 8.2  |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)              |                        | I <sub>DM</sub>  | 160                    | A    |
| Maximum Continuous Body Diode Forward Current (Note 6)          |                        | I <sub>S</sub>   | 40                     | A    |
| Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%) |                        | I <sub>SM</sub>  | 160                    | A    |
| Avalanche Current L = 0.3mH                                     |                        | I <sub>AS</sub>  | 16.2                   | A    |
| Avalanche Energy L = 0.3mH                                      |                        | E <sub>AS</sub>  | 39.4                   | mJ   |

**Thermal Characteristics**

| Characteristic                                   |                        | Symbol                            | Value       | Unit |
|--|------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 2.5         | W    |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State           | R <sub>θJA</sub>                  | 50          | °C/W |
| Total Power Dissipation (Note 6)                 | T <sub>C</sub> = +25°C | P <sub>D</sub>                    | 37.9        | W    |
| Thermal Resistance, Junction to Case (Note 6)    |                        | R <sub>θJC</sub>                  | 3.3         | °C/W |
| Operating and Storage Temperature Range          |                        | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

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

| Characteristic                             | Symbol              | Min | Typ  | Max | Unit | Test Condition  |
|--|---------------------|-----|------|-----|------|---|
| <b>OFF CHARACTERISTICS (Note 7)</b>        |                     |     |      |     |      |   |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 60  | —    | —   | 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> = 48V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —    | ±10 | µA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Note 7)</b>         |                     |     |      |     |      |   |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 1.4 | —    | 2.5 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                              |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —   | 10.8 | 14  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A   |
|  |                     | —   | 14.7 | 22  |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5A   |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.7  | 1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A   |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>    |                     |     |      |     |      |   |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 1072 | —   | pF   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V, f = 1MHz                                   |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 382  | —   |      |   |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 38   | —   |      |   |
| Gate Resistance                            | R <sub>G</sub>      | —   | 1.4  | —   | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                    |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 11.8 | —   | nC   | V <sub>DD</sub> = 30V, I <sub>D</sub> = 10A   |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 22.2 | —   |      |   |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 3.8  | —   |      |   |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 5.0  | —   |      |   |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  | —   | 8.2  | —   | ns   | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 30V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = 10A |
| Turn-On Rise Time                          | t <sub>R</sub>      | —   | 3.9  | —   |      |   |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> | —   | 21.2 | —   |      |   |
| Turn-Off Fall Time                         | t <sub>F</sub>      | —   | 15.7 | —   |      |   |
| Reverse Recovery Time                      | t <sub>RR</sub>     | —   | 30.6 | —   | ns   | I <sub>F</sub> = 10A, di/dt = 100A/µs   |
| Reverse Recovery Charge                    | Q <sub>RR</sub>     | —   | 21.9 | —   | nC   |   |

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz. copper, with thermal bias to bottom layer 1inch 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 product testing.

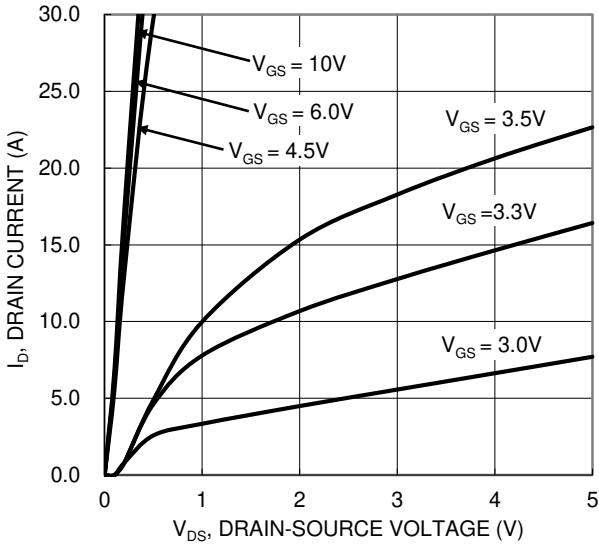


Figure 1. Typical Output Characteristic

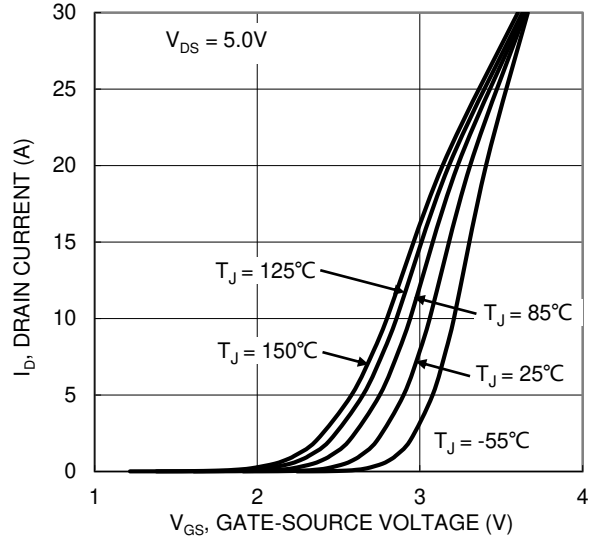


Figure 2. Typical Transfer Characteristic

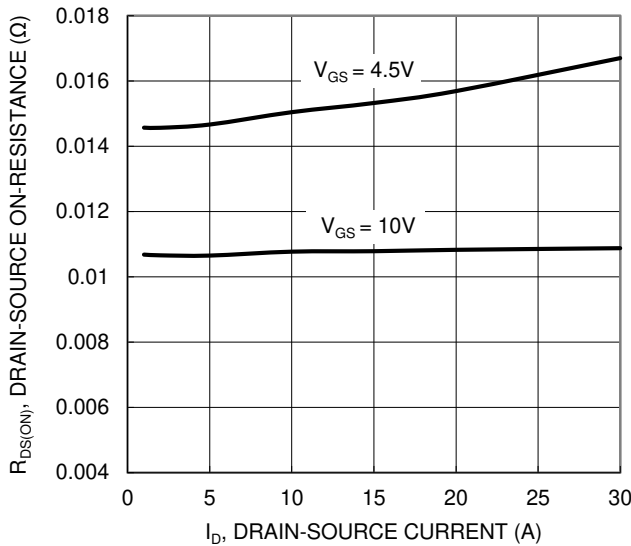


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

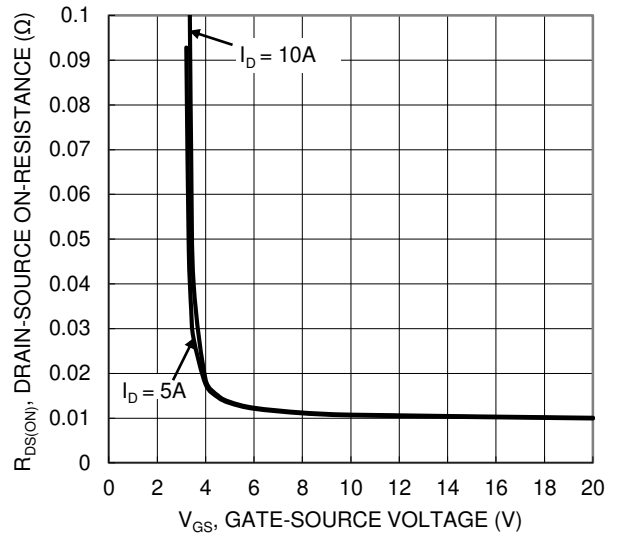


Figure 4. Typical Transfer Characteristic

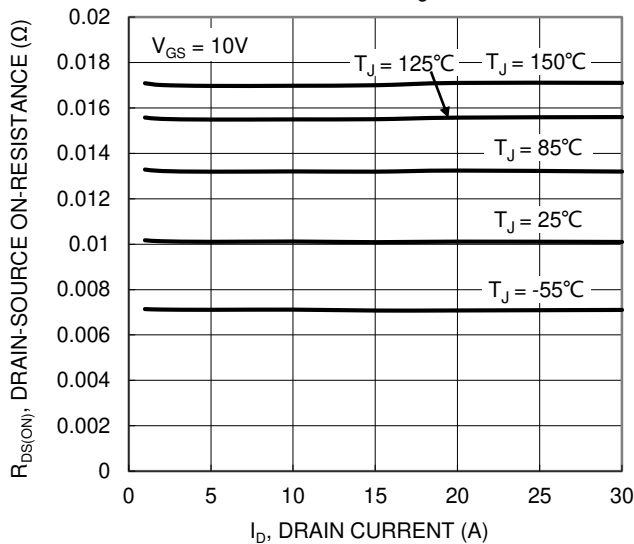


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

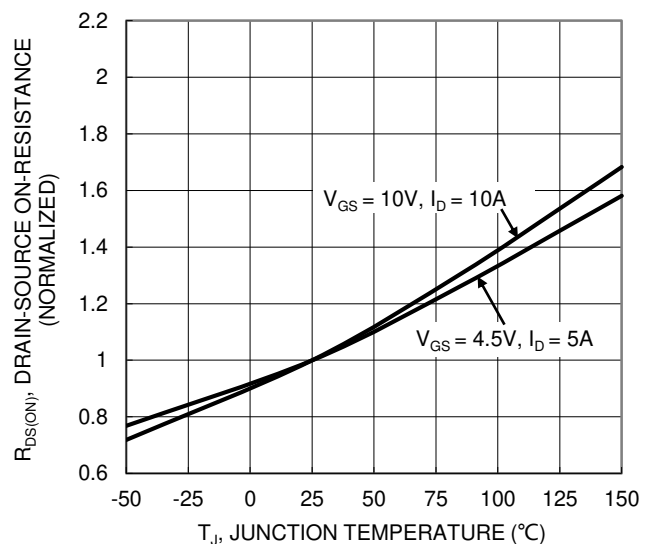


Figure 6. On-Resistance Variation with Junction Temperature

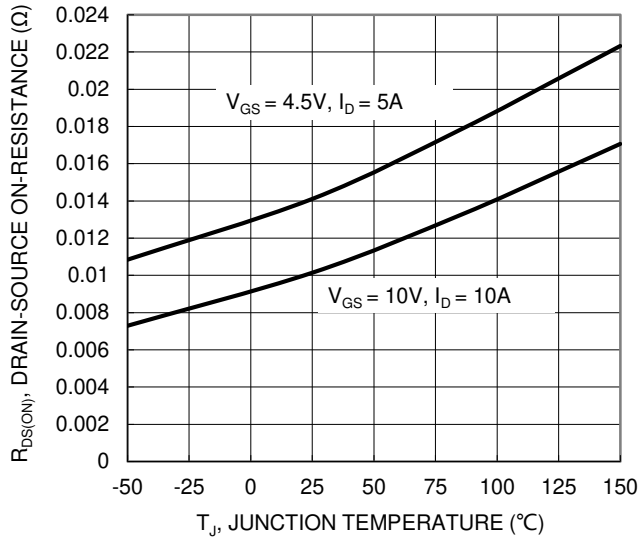


Figure 7. On-Resistance Variation with Junction Temperature

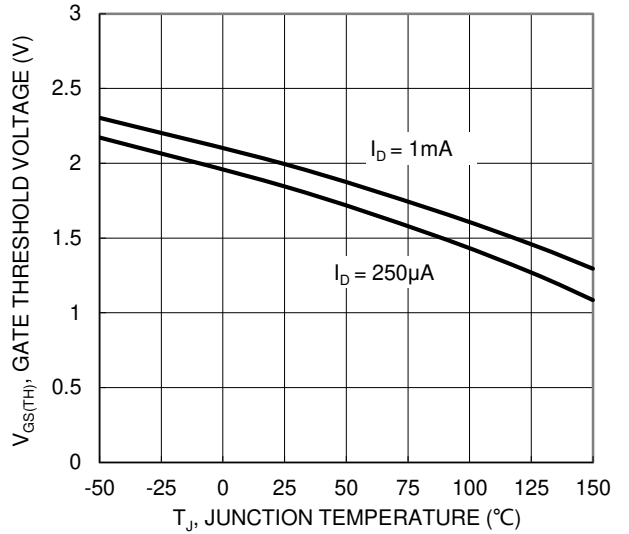


Figure 8. Gate Threshold Variation vs. Junction Temperature

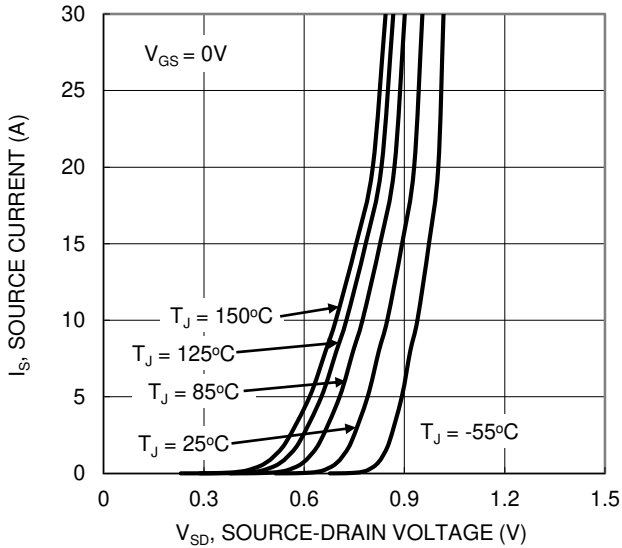


Figure 9. Diode Forward Voltage vs. Current

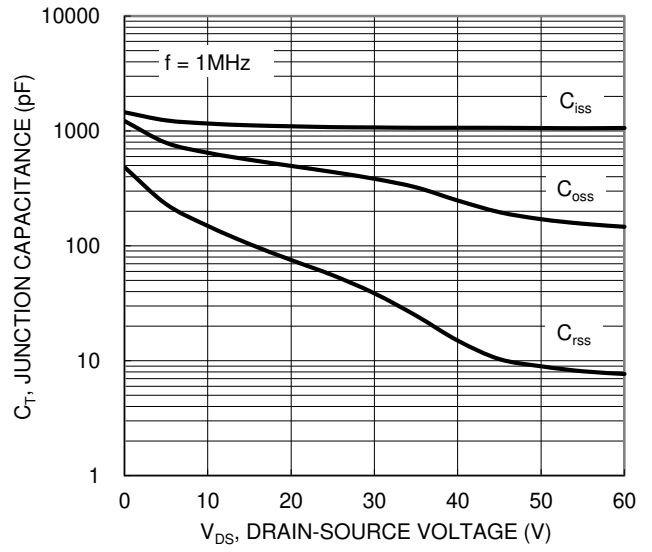


Figure 10. Typical Junction Capacitance

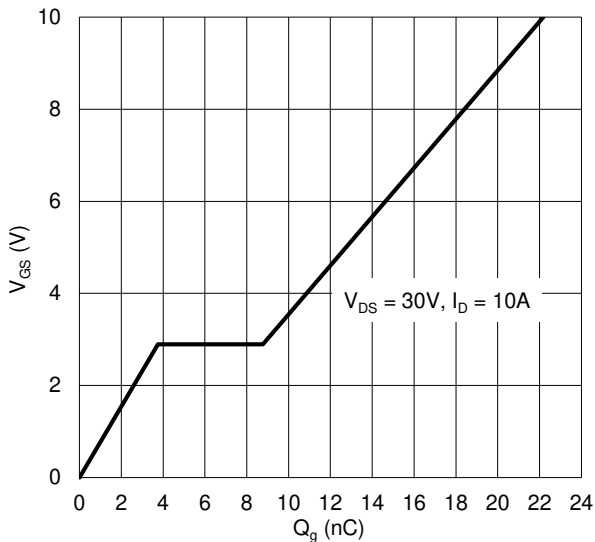


Figure 11. Gate Charge

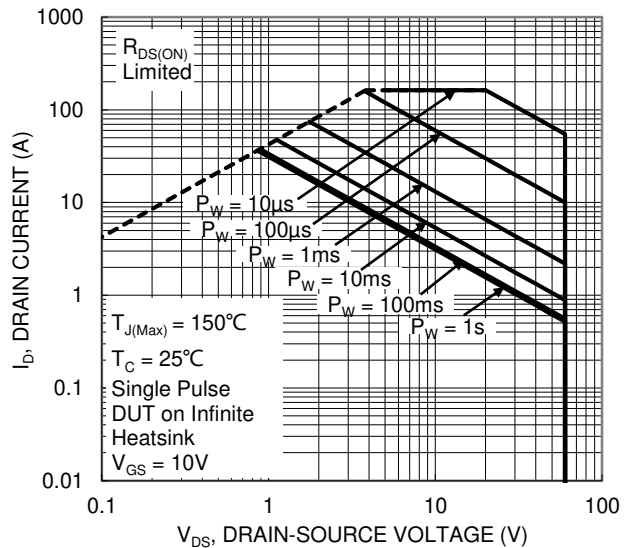


Figure 12. SOA, Safe Operation Area

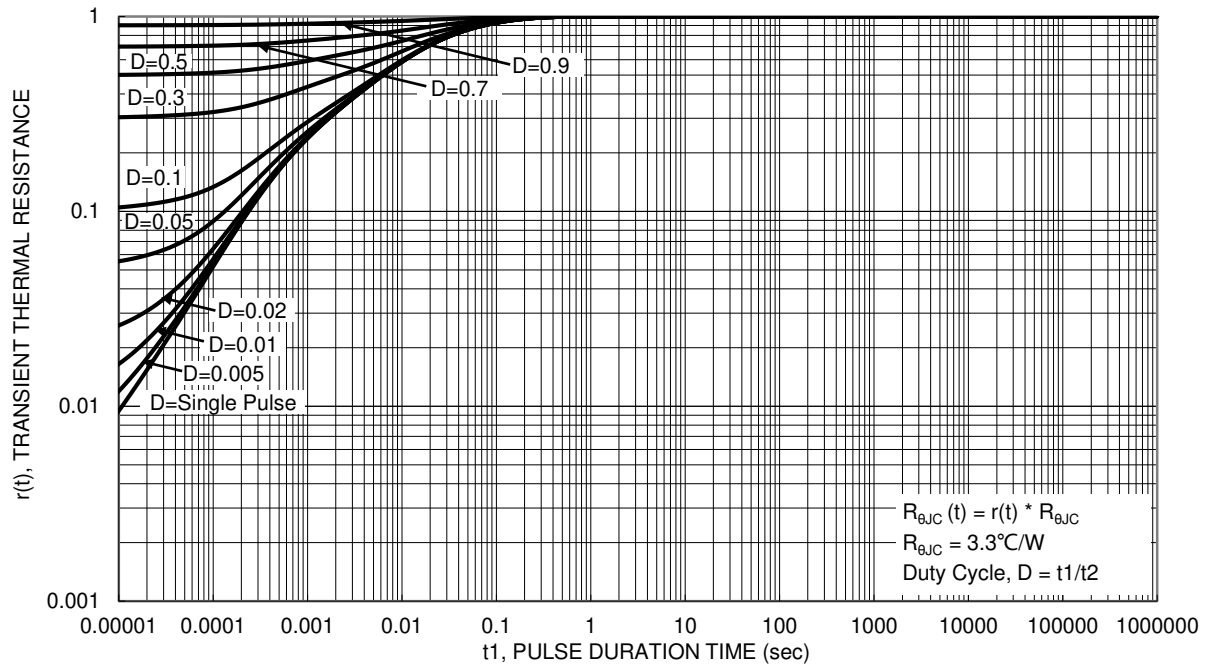
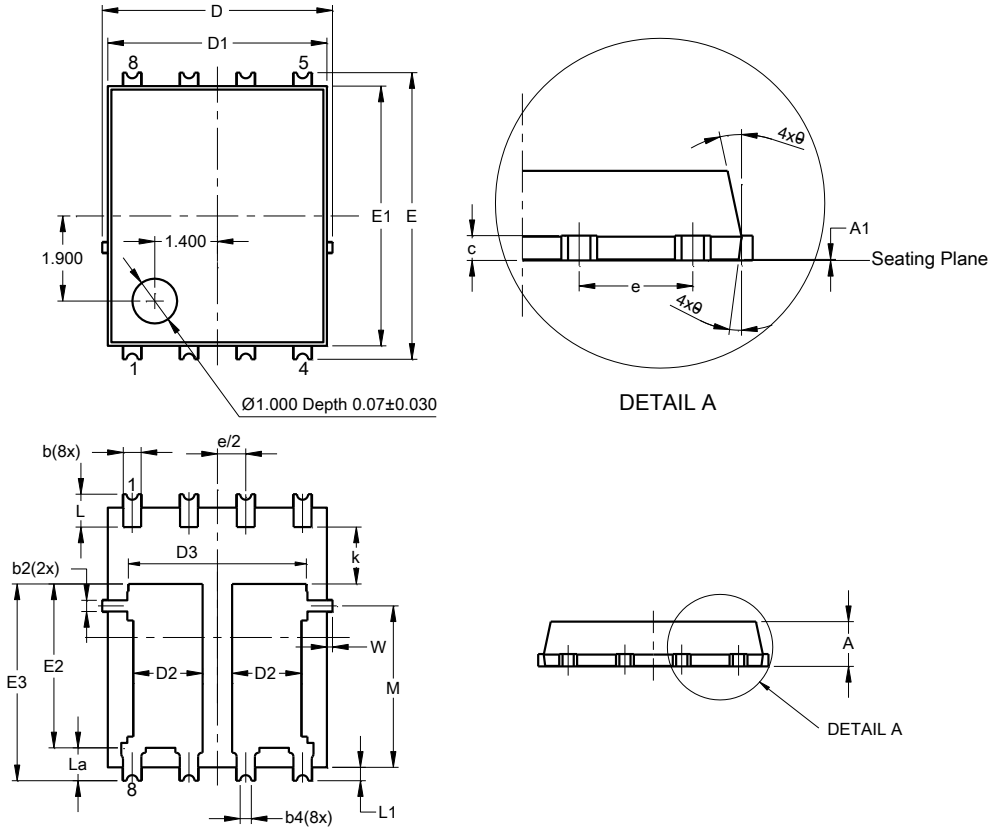


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**PowerDI5060-8/SWP (Type UXD)**

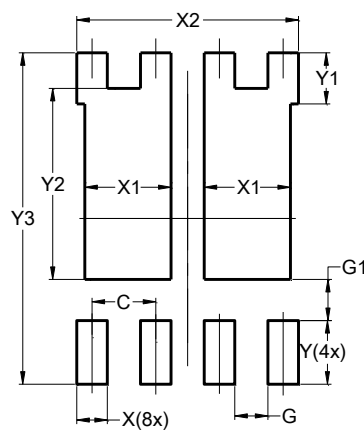


| PowerDI5060-8/SWP (Type UXD) |          |       |       |
|------------------------------|----------|-------|-------|
| Dim                          | Min      | Max   | Typ   |
| A                            | 0.90     | 1.10  | 1.00  |
| A1                           | 0.00     | 0.05  | --    |
| b                            | 0.30     | 0.50  | 0.41  |
| b2                           | 0.20     | 0.35  | 0.25  |
| b4                           | 0.25REF  |       |       |
| c                            | 0.230    | 0.330 | 0.277 |
| D                            | 5.15 BSC |       |       |
| D1                           | 4.70     | 5.10  | 4.90  |
| D2                           | 1.46     | 1.66  | 1.55  |
| D3                           | 3.78     | 4.18  | 3.98  |
| E                            | 6.40 BSC |       |       |
| E1                           | 5.60     | 6.00  | 5.80  |
| E2                           | 3.46     | 3.86  | 3.66  |
| E2a                          | 4.195    | 4.595 | 4.395 |
| e                            | 1.27BSC  |       |       |
| k                            | 1.05     | --    | --    |
| L                            | 0.635    | 0.835 | 0.735 |
| La                           | 0.635    | 0.835 | 0.735 |
| L1                           | 0.200    | 0.400 | 0.300 |
| M                            | 3.205    | 4.005 | 3.605 |
| W                            | 0.025    | 0.225 | 0.125 |
| θ                            | 10°      | 12°   | 11°   |
| θ1                           | 6°       | 8°    | 7°    |
| <b>All Dimensions in mm</b>  |          |       |       |

**Suggested Pad Layout**

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

**PowerDI5060-8/SWP (Type UXD)**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 1.270         |
| G          | 0.660         |
| G1         | 0.820         |
| X          | 0.610         |
| X1         | 1.720         |
| X2         | 4.420         |
| Y          | 1.270         |
| Y1         | 1.020         |
| Y2         | 3.810         |
| Y3         | 6.610         |

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