

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub>            | I <sub>D</sub><br>T <sub>A</sub> = +25°C |
|-------------------|--------------------------------|--|
| -30V              | 7.5mΩ @ V <sub>GS</sub> = -10V | -36A                                     |
|                   | 10mΩ @ V <sub>GS</sub> = -4.5V | -31A                                     |

## Description

This new generation 30V P-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 load switches.

## Applications

- Notebook battery power management
- DC-DC converters
- Load switches

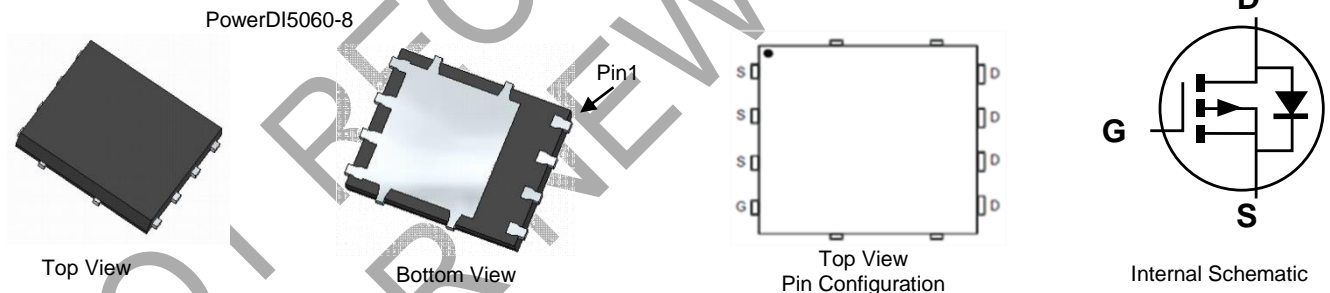
## Features

- 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
- <1.1mm Package Profile – Ideal for Thin Applications
- ESD HBM Protected up to 1kV
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DIODES™ DMP3010LPSQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

## Mechanical Data

- Package: PowerDI<sup>®</sup>5060-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminals: Finish – 100% Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (63)
- Weight: 0.097 grams (Approximate)

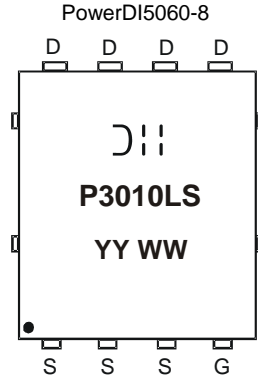


## Ordering Information (Note 4)

| Part Number    | Package       | Packing |             |
|----------------|---------------|---------|-------------|
|                |               | Qty.    | Carrier     |
| DMP3010LPSQ-13 | PowerDI5060-8 | 2,500   | Tape & Reel |

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  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**



D|| = Manufacturer's Marking  
 P3010LS = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 22 = 2022)  
 WW = Week (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> | -30                             | V    |
| Gate-Source Voltage                                      |              | V <sub>GSS</sub> | ±20                             | V    |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V  | Steady State | I <sub>D</sub>   | T <sub>A</sub> = +25°C<br>-36   | A    |
|  |              |                  | T <sub>A</sub> = +70°C<br>-29   |      |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V | Steady State | I <sub>D</sub>   | T <sub>A</sub> = +25°C<br>-31   | A    |
|  |              |                  | T <sub>A</sub> = +70°C<br>-25   |      |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V  | Steady State | I <sub>D</sub>   | T <sub>A</sub> = +25°C<br>-14.5 | A    |
|  |              |                  | T <sub>A</sub> = +70°C<br>-11.5 |      |
| Pulsed Drain Current (Notes 6 & 7)                       |              | I <sub>DM</sub>  | -100                            | A    |
| Avalanche Current (Notes 8 & 9)                          |              | I <sub>AS</sub>  | -17.5                           | A    |
| Avalanche Energy (Notes 8 & 9), L = 1mH                  |              | E <sub>AS</sub>  | 153                             | mJ   |

**Thermal Characteristics**

| Characteristic  | Symbol                            | Value       | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation (Note 10)   | P <sub>D</sub>                    | 1.26        | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 10)   | R <sub>θJA</sub>                  | 97          | °C/W |
| Power Dissipation (Note 6)  | P <sub>D</sub>                    | 2.18        | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6)    | R <sub>θJA</sub>                  | 55          | °C/W |
| Power Dissipation (Note 5)  | P <sub>D</sub>                    | 14.37       | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5)    | R <sub>θJA</sub>                  | 8.7         | °C/W |
| Power Dissipation (Notes 5 & 11)  | P <sub>D</sub>                    | 58.7        | W    |
| Thermal Resistance, Junction to Case @T <sub>C</sub> = +25°C (Notes 5 & 11) | R <sub>θJC</sub>                  | 2.13        | °C/W |
| Operating and Storage Temperature Range                                     | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

- Notes:
- Device mounted on FR-4 PCB with infinite heatsink.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - Repetitive rating, pulse width limited by junction temperature, 10µs pulse, duty cycle = 1%.
  - I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - R<sub>θJC</sub> is guaranteed by design while R<sub>θCA</sub> is determined by the user's board design.

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

| Characteristic                              | Symbol              | Min  | Typ   | Max  | Unit | Test Condition   |
|---|---------------------|------|-------|------|------|--|
| <b>OFF CHARACTERISTICS</b> (Note 9)         |                     |      |       |      |      |  |
| Drain-Source Breakdown Voltage              | BV <sub>DSS</sub>   | -30  | —     | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA  |
| Zero Gate Voltage Drain Current             | I <sub>DSS</sub>    | —    | —     | -1   | μA   | V <sub>DS</sub> = -30V, 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 9)          |                     |      |       |      |      |  |
| Gate Threshold Voltage                      | V <sub>GS(TH)</sub> | -1.1 | -1.6  | -2.1 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                  |
| Static Drain-Source On-Resistance           | R <sub>DS(ON)</sub> | —    | 5.7   | 7.5  | mΩ   | V <sub>GS</sub> = -10V, I <sub>D</sub> = -10A  |
|   |                     | —    | 7.2   | 10   |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -10A   |
| Forward Transfer Admittance                 | Y <sub>fs</sub>     | —    | 30    | —    | S    | V <sub>DS</sub> = -15V, I <sub>D</sub> = -10A  |
| Diode Forward Voltage                       | V <sub>SD</sub>     | —    | -0.65 | -1   | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A   |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 12)    |                     |      |       |      |      |  |
| Input Capacitance                           | C <sub>iss</sub>    | —    | 6,234 | —    | pF   | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V<br>f = 1MHz                                      |
| Output Capacitance                          | C <sub>oss</sub>    | —    | 1,500 | —    | pF   |  |
| Reverse Transfer Capacitance                | C <sub>rss</sub>    | —    | 774   | —    | pF   |  |
| Gate Resistance                             | R <sub>g</sub>      | —    | 1.28  | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz   |
| Total Gate Charge (V <sub>GS</sub> = -10V)  | Q <sub>g</sub>      | —    | 126.2 | —    | nC   | V <sub>DS</sub> = -15V, I <sub>D</sub> = -10A  |
| Total Gate Charge (V <sub>GS</sub> = -4.5V) | Q <sub>g</sub>      | —    | 59.2  | —    | nC   | V <sub>DS</sub> = -15V, V <sub>GS</sub> = -4.5V<br>I <sub>D</sub> = -10A                     |
| Gate-Source Charge                          | Q <sub>gs</sub>     | —    | 16.1  | —    | nC   |  |
| Gate-Drain Charge                           | Q <sub>gd</sub>     | —    | 15.7  | —    | nC   |  |
| Turn-On Delay Time                          | t <sub>D(ON)</sub>  | —    | 11.4  | —    | ns   | V <sub>DS</sub> = -15V, V <sub>GEN</sub> = -10V<br>R <sub>G</sub> = 6Ω, I <sub>D</sub> = -1A |
| Turn-On Rise Time                           | t <sub>r</sub>      | —    | 9.4   | —    | ns   |  |
| Turn-Off Delay Time                         | t <sub>D(OFF)</sub> | —    | 260.7 | —    | ns   |  |
| Turn-Off Fall Time                          | t <sub>f</sub>      | —    | 99.3  | —    | ns   |  |

Notes: 9. Short duration pulse test used to minimize self-heating effect.  
12. Guaranteed by design. Not subject to product testing.

NOT RECOMMENDED FOR NEW DESIGN

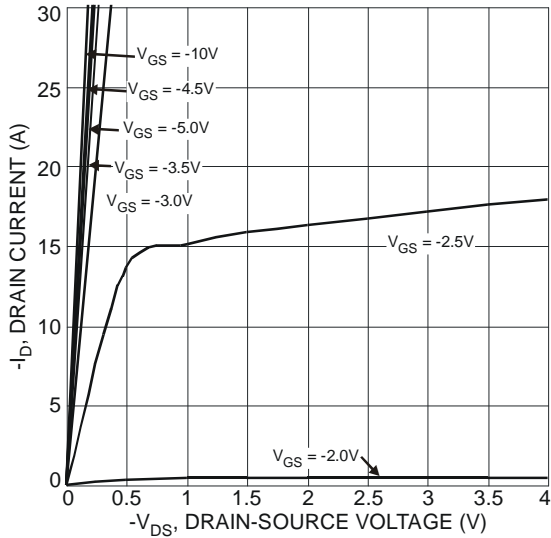


Fig. 1 Typical Output Characteristic

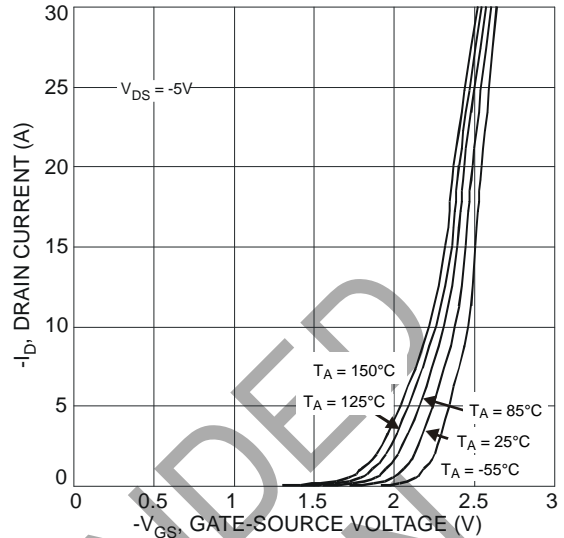


Fig. 2 Typical Transfer Characteristic

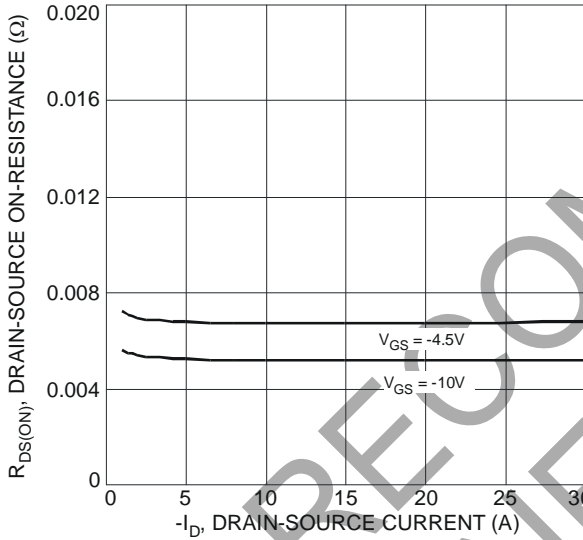


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

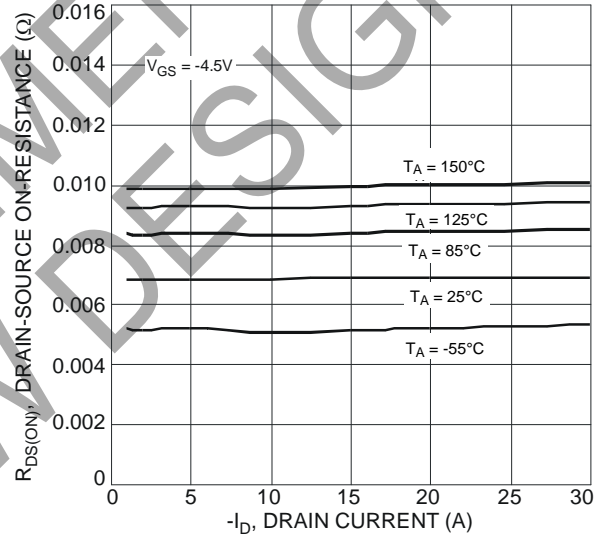


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

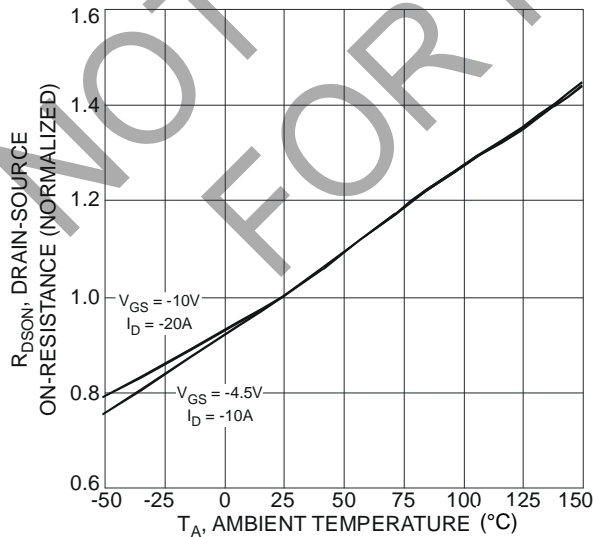


Fig. 5 On-Resistance Variation with Temperature

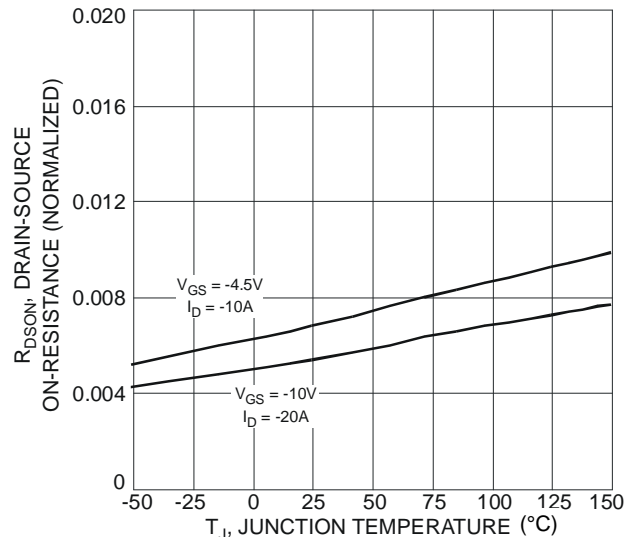


Fig. 6 On-Resistance Variation with Temperature

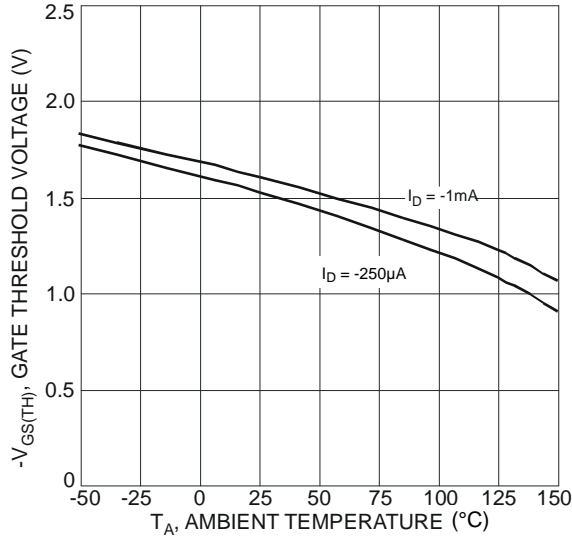


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

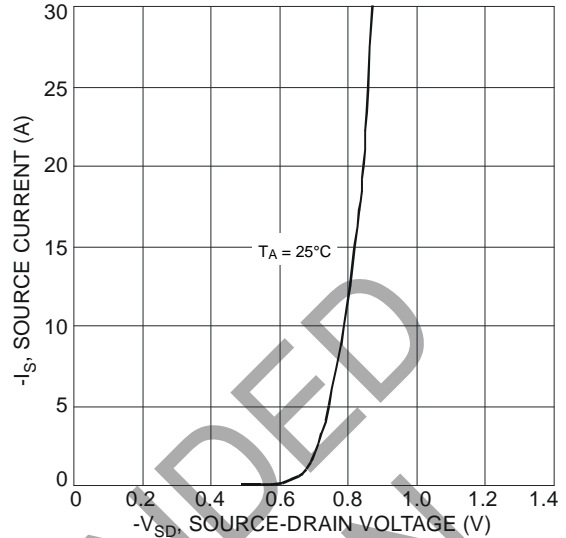


Fig. 8 Diode Forward Voltage vs. Current

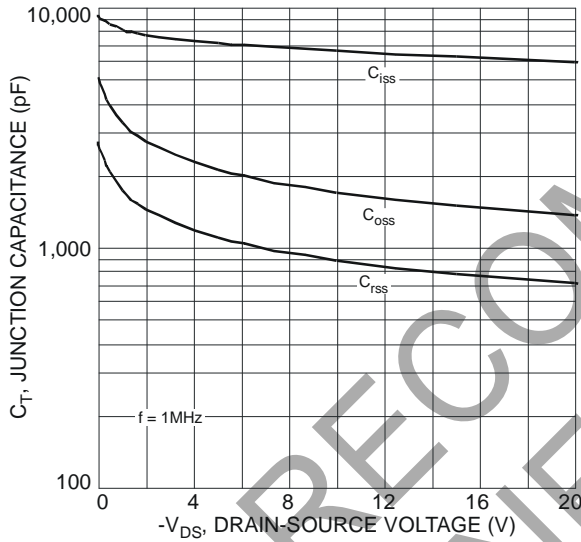


Fig. 9 Typical Total Capacitance

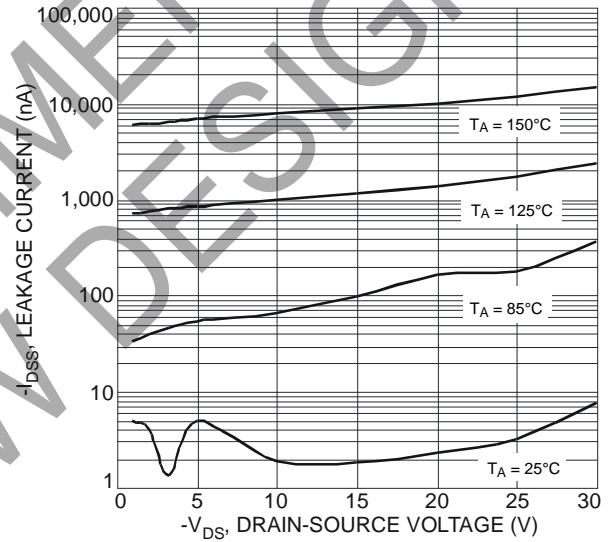


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

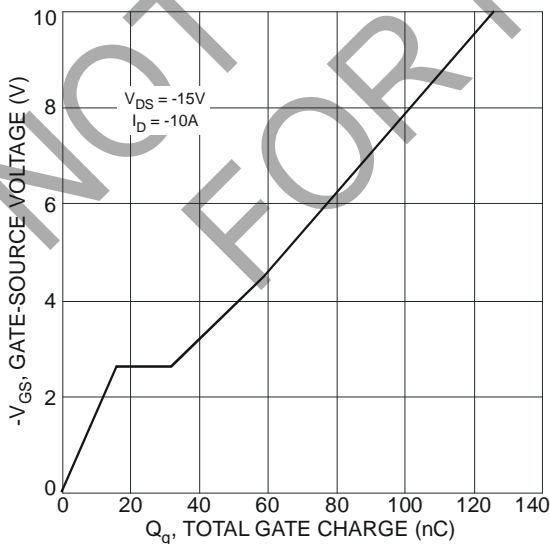


Fig. 11 Gate-Source Voltage vs. Total Gate Charge

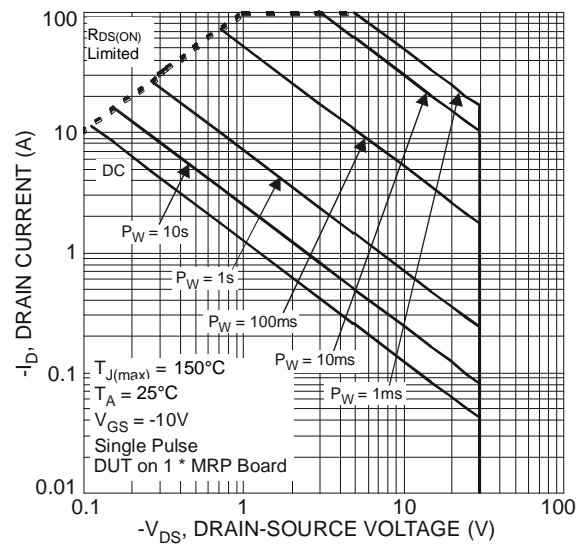


Fig. 12 SOA, Safe Operation Area

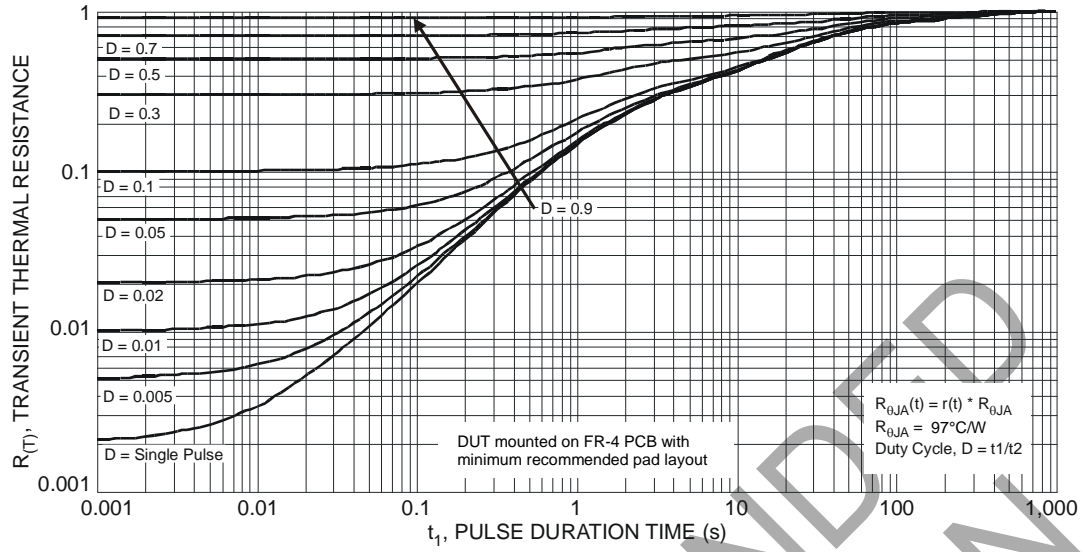


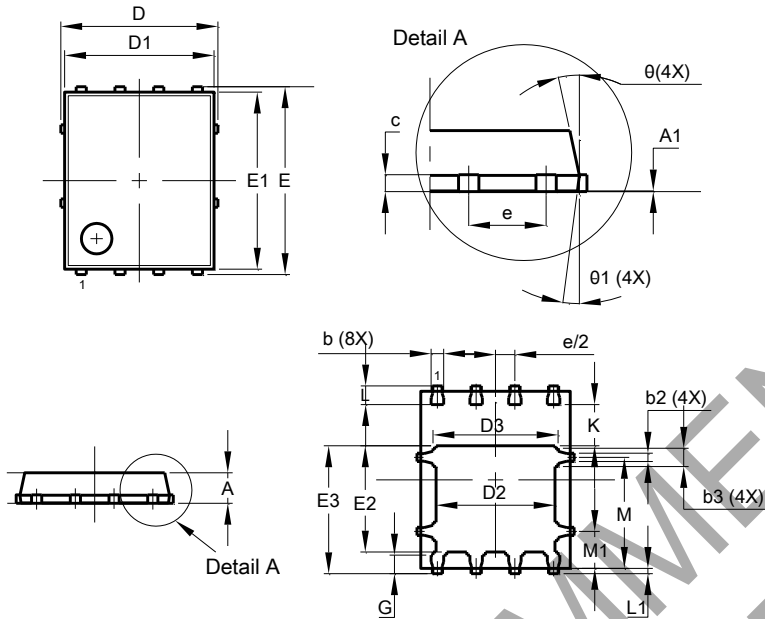
Fig. 13 Transient Thermal Response

NOT RECOMMENDED FOR NEW DESIGN

**Package Outline Dimensions**

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

**PowerDI5060-8**

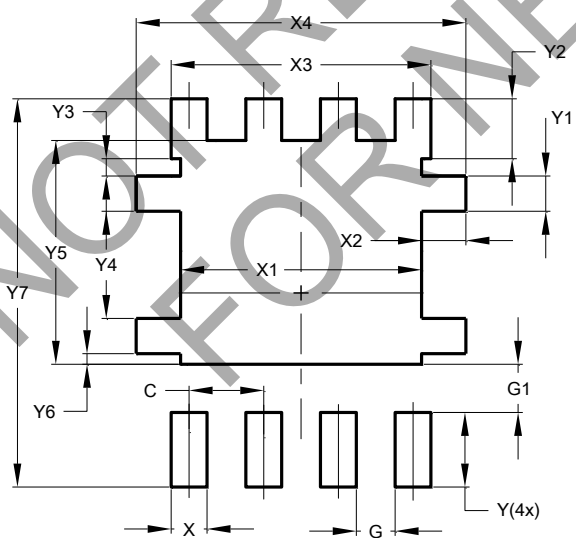


| PowerDI5060-8        |          |       |       |
|----------------------|----------|-------|-------|
| Dim                  | Min      | Max   | Typ   |
| A                    | 0.90     | 1.10  | 1.00  |
| A1                   | 0.00     | 0.05  | —     |
| b                    | 0.33     | 0.51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