

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max       | I <sub>D</sub><br>T <sub>C</sub> = +25°C<br>(Note 9) |
|-------------------|-------------------------------|--|
| 40V               | 3.3mΩ @ V <sub>GS</sub> = 10V | 100A   |
|                   | 5.0mΩ @ V <sub>GS</sub> = 5V  | 95A  |

## 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:

- BLDC motors
- DC-DC converters
- Load switches

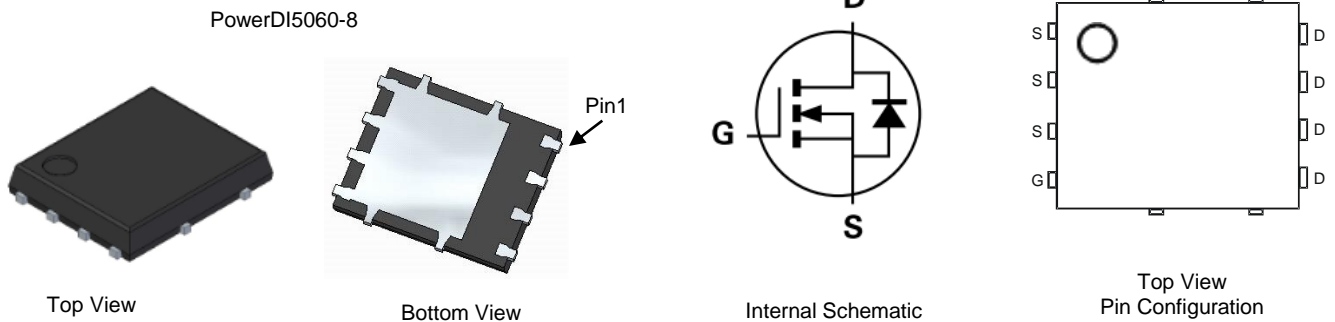
## Features

- 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 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)**
- **The DIODES™ DMTH43M8LPSQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**  
<https://www.diodes.com/quality/product-definitions/>

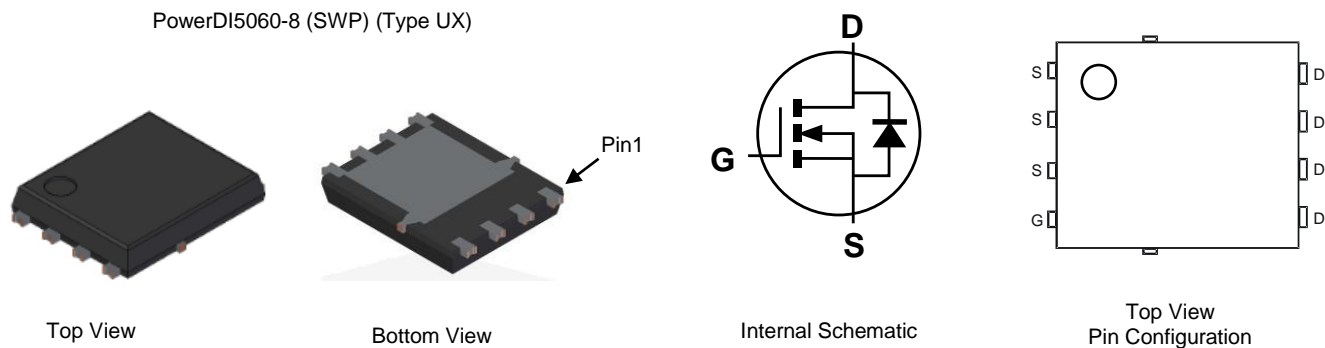
## Mechanical Data

- 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 Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 ⑥③
- Weight: 0.097 grams (Approximate)

Site1:



Site2:



- 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.

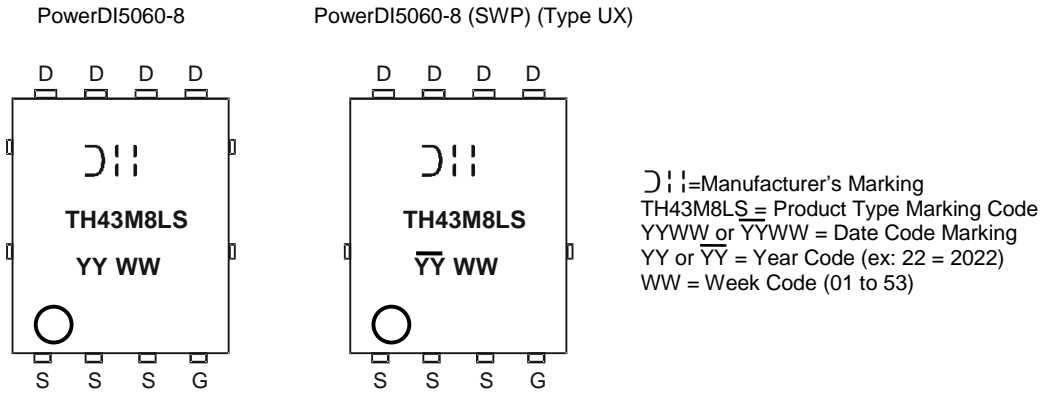
PowerDI is a registered trademark of Diodes Incorporated.

**Ordering Information** (Note 4)

| Part Number     | Package                       | Packing |             |
|-----------------|-------------------------------|---------|-------------|
|                 |                               | Qty.    | Carrier     |
| DMTH43M8LPSQ-13 | PowerDI5060-8                 | 2,500   | Tape & Reel |
| DMTH43M8LPSQ-13 | PowerDI5060-8 (SWP) (Type UX) | 2,500   | Tape & Reel |

Note: 4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

**Marking Information**



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

| Characteristic  | Symbol           | Value                   | Unit |
|---|------------------|-------------------------|------|
| Drain-Source Voltage  | V <sub>DSS</sub> | 40                      | V    |
| Gate-Source Voltage   | V <sub>GSS</sub> | ±20                     | V    |
| Continuous Drain Current, V <sub>GS</sub> = 10V (Note 5)          | I <sub>D</sub>   | T <sub>A</sub> = +25°C  | 22   |
|   |                  | T <sub>A</sub> = +100°C | 15.5 |
| Continuous Drain Current, V <sub>GS</sub> = 10V (Note 6) (Note 9) | I <sub>D</sub>   | T <sub>C</sub> = +25°C  | 100  |
|   |                  | T <sub>C</sub> = +100°C | 82   |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)                | I <sub>DM</sub>  | 350                     | A    |
| Maximum Continuous Body Diode Forward Current (Note 6)            | I <sub>S</sub>   | 69                      | A    |
| Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)   | I <sub>SM</sub>  | 350                     | A    |
| Avalanche Current, L = 1mH  | I <sub>AS</sub>  | 13.2                    | A    |
| Avalanche Energy, L = 1mH   | E <sub>AS</sub>  | 87                      | mJ   |

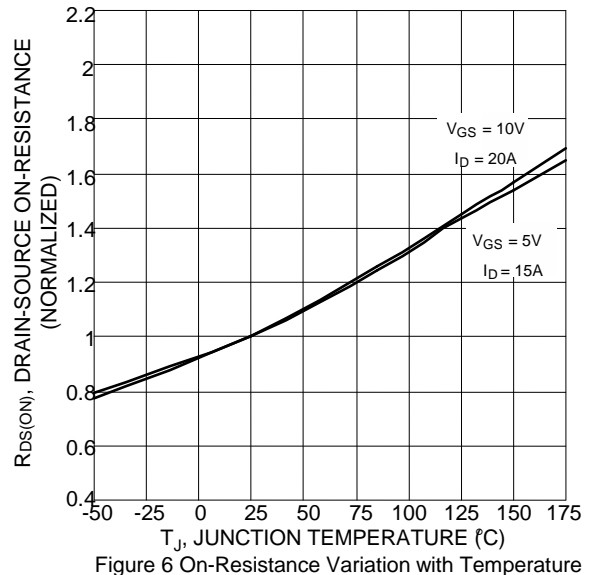
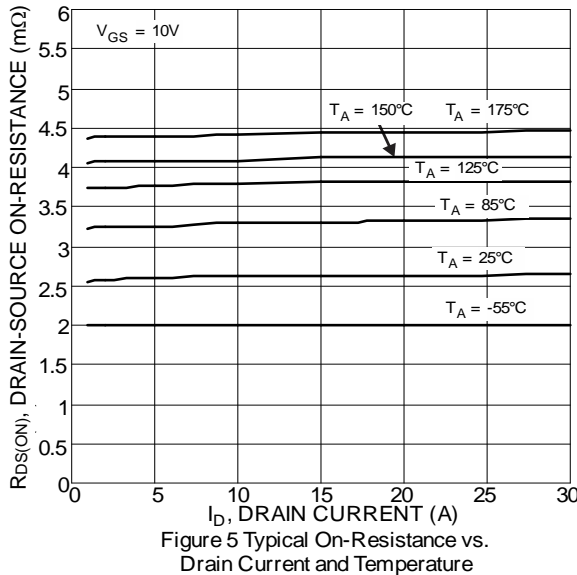
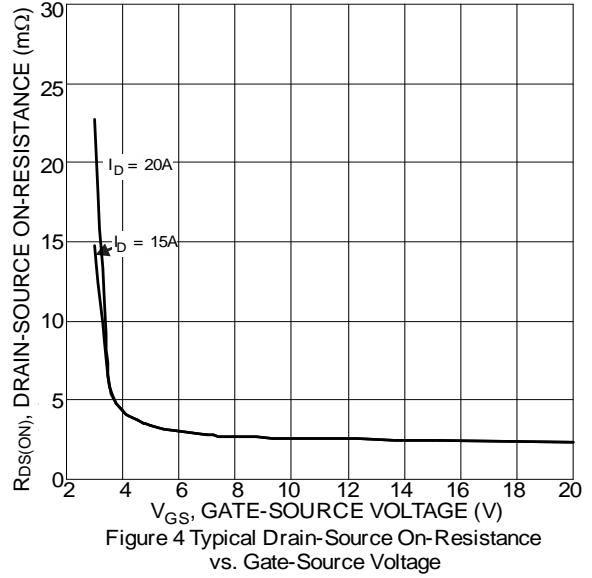
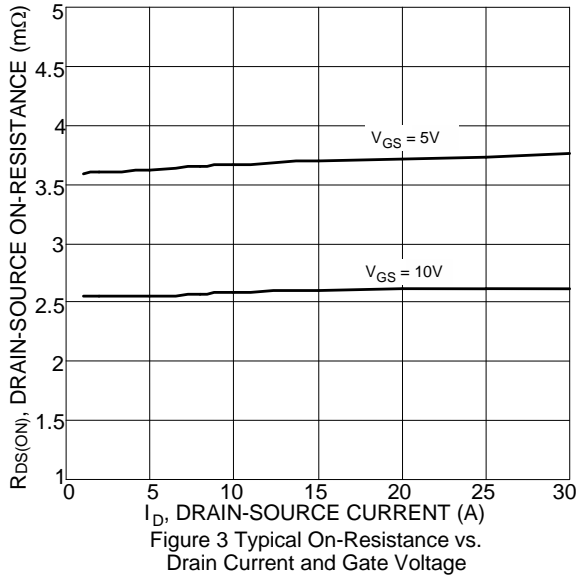
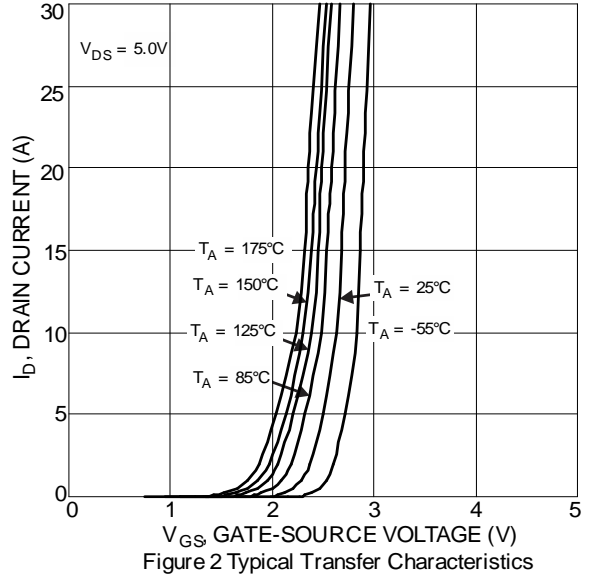
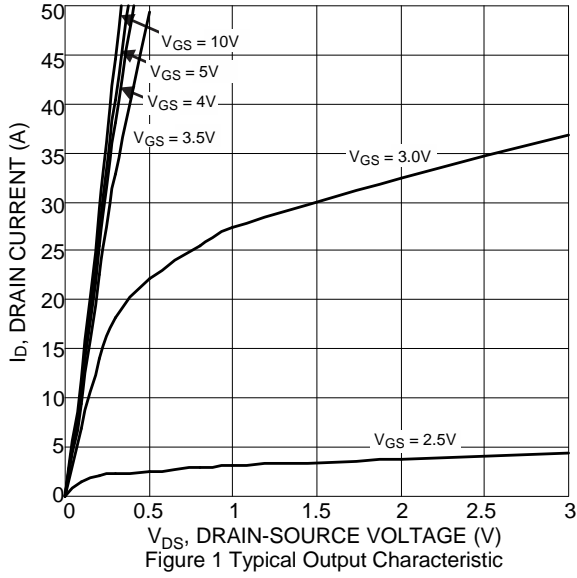
**Thermal Characteristics**

| Characteristic                                   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 2.7         | W    |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 55          | °C/W |
| Total Power Dissipation (Note 6)                 | P <sub>D</sub>                    | 83          | W    |
| Thermal Resistance, Junction to Case (Note 6)    | R <sub>θJC</sub>                  | 1.8         | °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> | 1   | —     | 2.5   | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                                |
| Static Drain-Source On-Resistance (T <sub>C</sub> = +25°C)           | R <sub>DS(ON)</sub> | —   | 2.7   | 3.3   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A   |
|  |                     | —   | 3.6   | 5.0   |      | V <sub>GS</sub> = 5V, I <sub>D</sub> = 15A  |
| Static Drain-Source On-Resistance (T <sub>C</sub> = +175°C) (Note 8) | R <sub>DS(ON)</sub> | —   | 4.7   | —     | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A   |
| Diode Forward Voltage  | V <sub>SD</sub>     | —   | —     | 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>    | —   | 2,693 | 3,367 | pF   | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V, f = 1MHz                                     |
| Output Capacitance   | C <sub>OSS</sub>    | —   | 850   | 1105  |      |   |
| Reverse Transfer Capacitance   | C <sub>RSS</sub>    | —   | 52    | 104   |      |   |
| Gate Resistance  | R <sub>G</sub>      | —   | 2.54  | 5.1   | 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>      | —   | 38.5  | 49    | nC   | V <sub>DS</sub> = 20V, I <sub>D</sub> = 20A   |
| Total Gate Charge (V <sub>GS</sub> = 4.5V)                           | Q <sub>G</sub>      | —   | 17.6  | 22    |      |   |
| Gate-Source Charge   | Q <sub>GS</sub>     | —   | 6.9   | 11    |      |   |
| Gate-Drain Charge  | Q <sub>GD</sub>     | —   | 6.9   | 11    |      |   |
| Turn-On Delay Time   | t <sub>D(ON)</sub>  | —   | 5.2   | 10    | ns   | V <sub>DD</sub> = 20V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A, R <sub>G</sub> = 1.6Ω |
| Turn-On Rise Time  | t <sub>R</sub>      | —   | 5.7   | 11    |      |   |
| Turn-Off Delay Time  | t <sub>D(OFF)</sub> | —   | 23.5  | 46    |      |   |
| Turn-Off Fall Time   | t <sub>F</sub>      | —   | 11    | 22    |      |   |
| Body Diode Reverse Recovery Time                                     | t <sub>RR</sub>     | —   | 35.4  | 70    | ns   | I <sub>F</sub> = 15A, di/dt = 100A/µs   |
| Body Diode Reverse Recovery Charge                                   | Q <sub>RR</sub>     | —   | 32.9  | —     | nC   |   |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
  - Thermal resistance from junction to soldering point (on the exposed drain pad).
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.
  - Package limit.



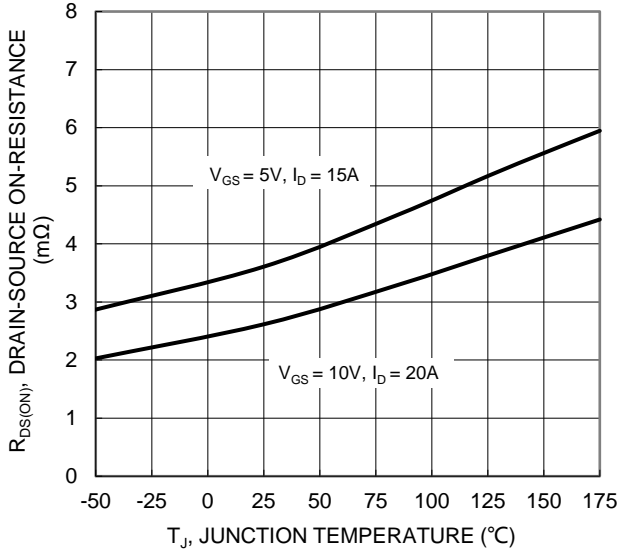


Figure 7. On-Resistance Variation with Temperature

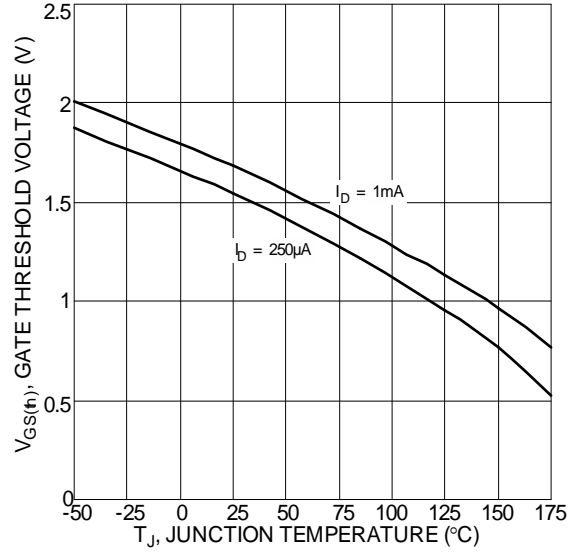


Figure 8 Gate Threshold Variation vs. Temperature

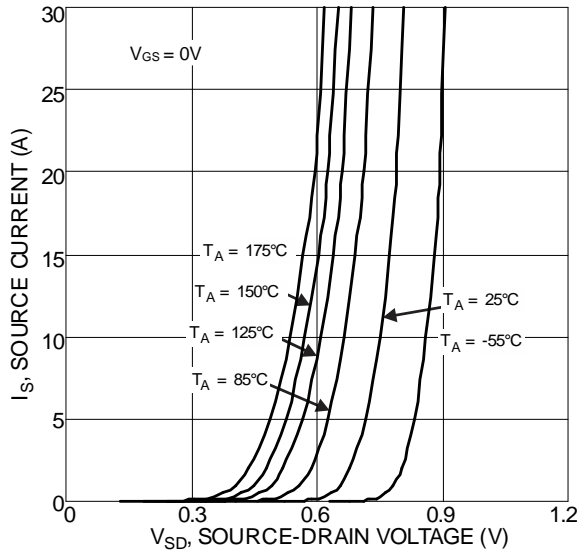


Figure 9 Diode Forward Voltage vs. Current

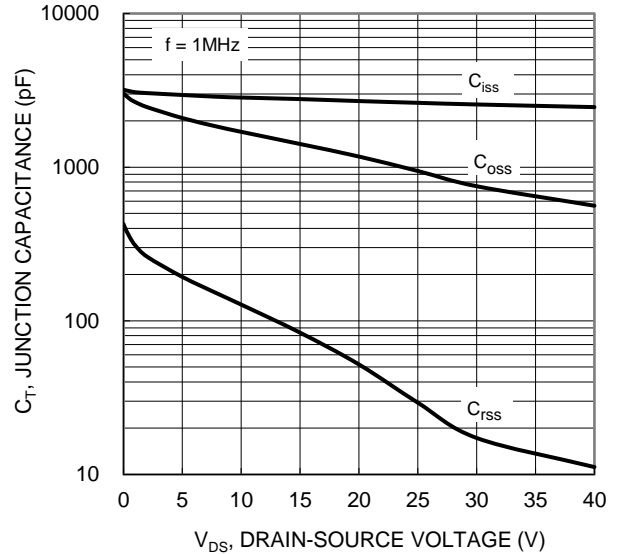


Figure 10. Typical Junction Capacitance

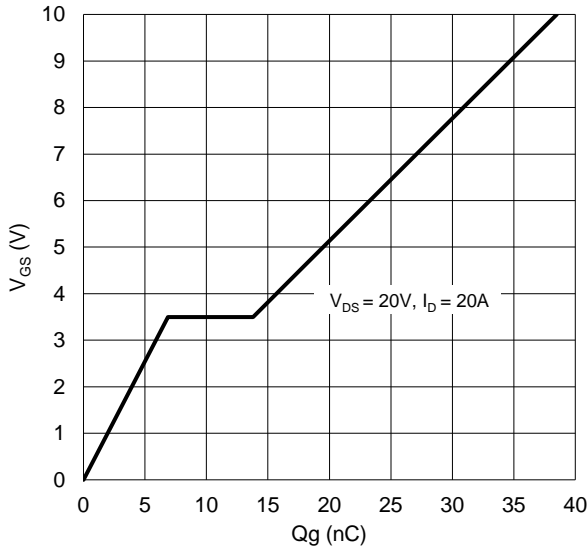


Figure 11. Gate Charge

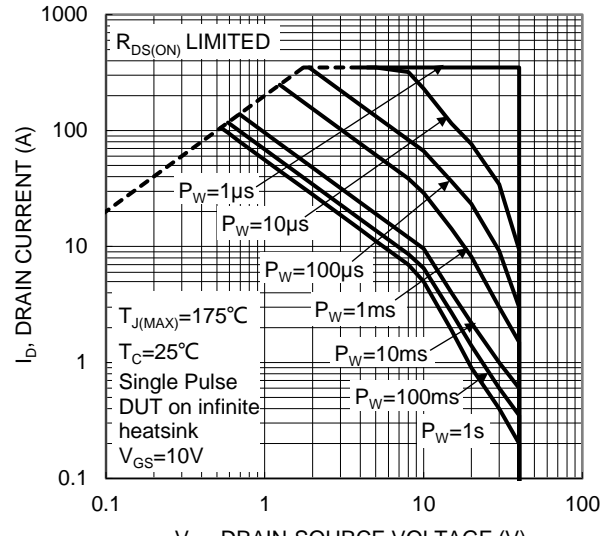


Figure 12. SOA, Safe Operation Area

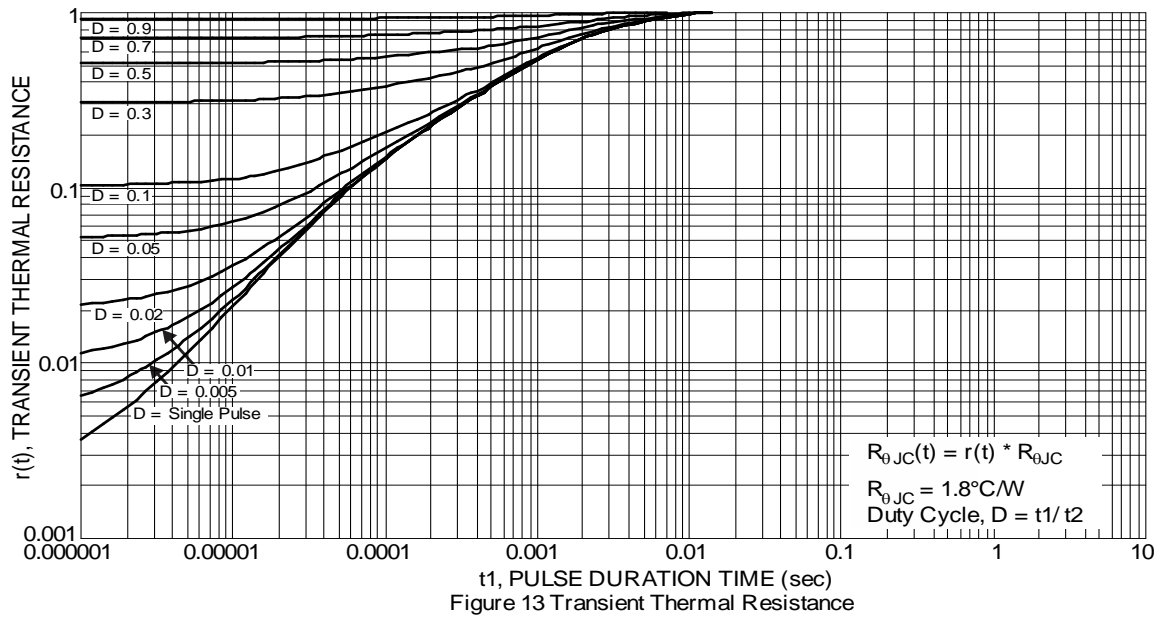


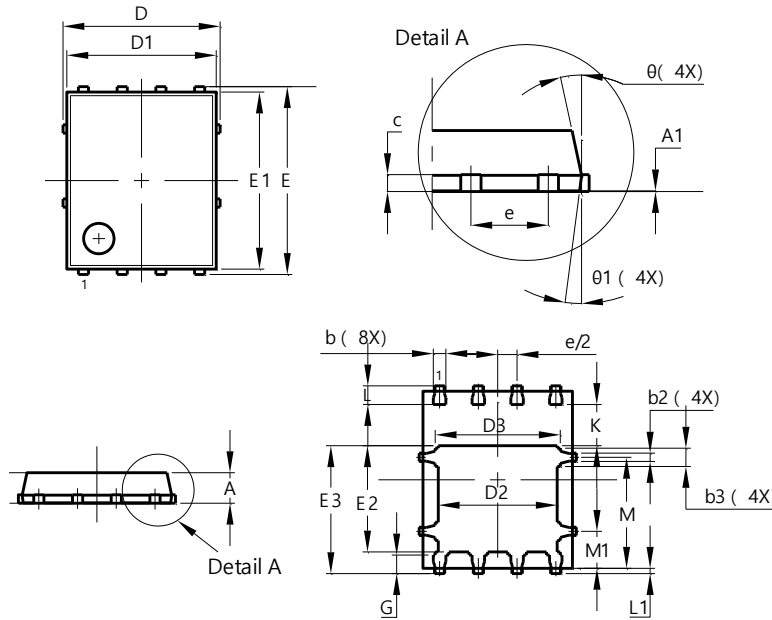
Figure 13 Transient Thermal Resistance

**Package Outline Dimensions**

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

Site1

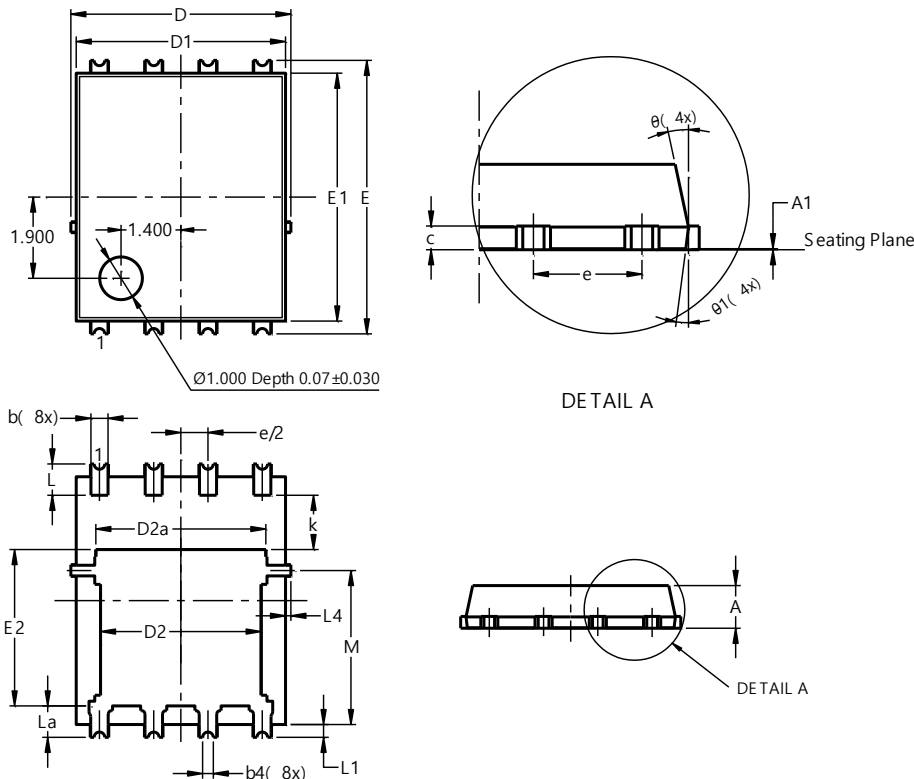
**PowerDI5060-8**



| 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 |          |       |       |

Site2

**PowerDI5060-8 (SWP) (Type UX)**



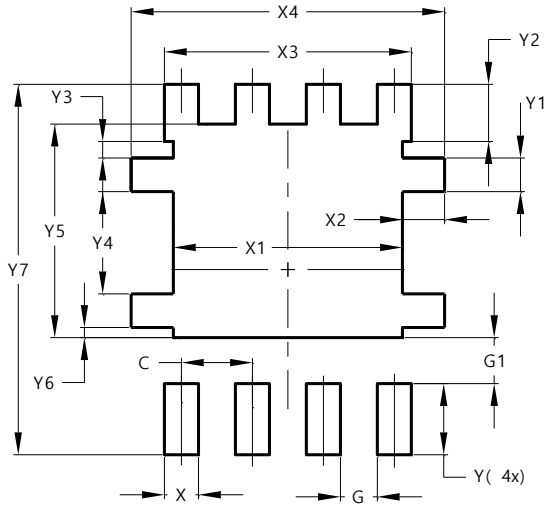
| PowerDI5060-8 (SWP)<br>(Type UX) |          |       |       |
|----------------------------------|----------|-------|-------|
| Dim                              | Min      | Max   | Typ   |
| A                                | 0.90     | 1.10  | 1.00  |
| A1                               | 0        | 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                               | 3.56     | 3.96  | 3.76  |
| D2a                              | 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 |
| L1a                              | 0.050REF |       |       |
| L4                               | 0.025    | 0.225 | 0.125 |
| M                                | 3.205    | 4.005 | 3.605 |
| 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.

Site1:

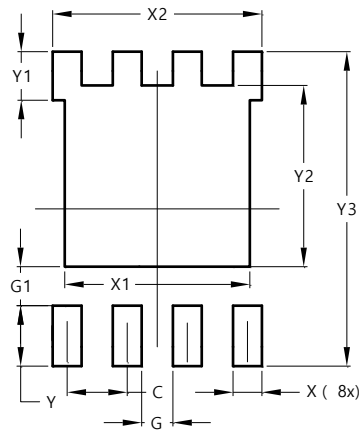
**PowerDI5060-8**



| 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         |

Site2:

**PowerDI5060-8 (SWP) (Type UX)**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 1.270         |
| G          | 0.660         |
| G1         | 0.820         |
| X          | 0.610         |
| X1         | 4.100         |
| X2         | 4.420         |
| Y          | 1.270         |
| Y1         | 1.020         |
| Y2         | 3.810         |
| Y3         | 6.610         |



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