

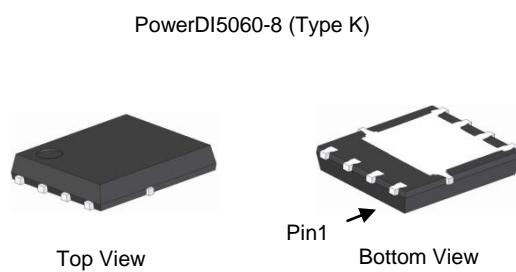
Product Summary

| BV_{DSS} | $R_{DS(ON)} \text{ max}$ | I_D $T_C = +25^\circ\text{C}$ (Note 9) |
|------------|--|--|
| 40V | 1.8m Ω @ $V_{GS} = 10\text{V}$ | 100A |
| | 3.1m Ω @ $V_{GS} = 4.5\text{V}$ | 100A |

Description and Applications

This MOSFET has been designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

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

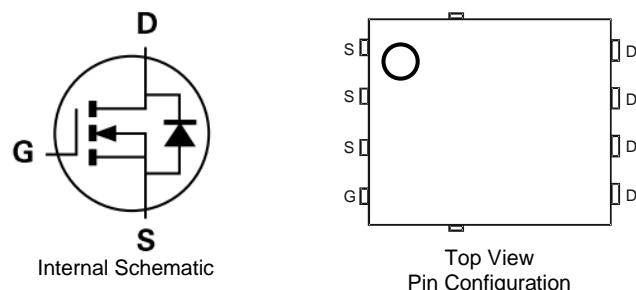


Features

- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low $R_{DS(ON)}$ – Minimizes On State Losses
- <1.1mm Package Profile – Ideal for Thin Applications
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

- Case: PowerDI5060-8 (Type K)
- 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 (e3)
- Weight: 0.097 grams (Approximate)



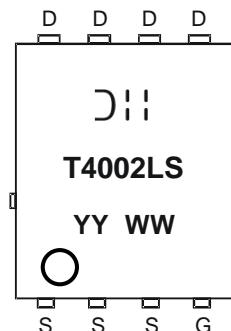
Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|------------------------|---------------------|
| DMT4002LPS-13 | PowerDI5060-8 (Type K) | 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 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



DII = Manufacturer's Marking
T4002LS = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 16 = 2016)
WW = Week Code (01 to 53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | | Symbol | Value | Units |
|--|--|-----------|------------|-------|
| Drain-Source Voltage | | V_{DSS} | 40 | V |
| Gate-Source Voltage | | V_{GSS} | ± 20 | V |
| Continuous Drain Current, $V_{GS} = 10\text{V}$ (Notes 6, 9) | $T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$ | I_D | 100 100 | A |
| Pulsed Drain Current (10 μs pulse, duty cycle = 1%) | | I_{DM} | 200 | A |
| Continuous Body Diode Forward Current (Note 6) | $T_C = +25^\circ\text{C}$ | I_S | 85 | A |
| Avalanche Current, $L = 0.1\text{mH}$ | | I_{AS} | 48 | A |
| Avalanche Energy, $L = 0.1\text{mH}$ | | E_{AS} | 115 | mJ |

Thermal Characteristics

| Characteristic | | Symbol | Value | Units |
|--|--|-----------------|-------------|---------------------------|
| Total Power Dissipation (Note 5) | | P_D | 2.3 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | | $R_{\theta JA}$ | 55 | $^\circ\text{C}/\text{W}$ |
| Total Power Dissipation (Note 6) | | P_D | 104 | W |
| Thermal Resistance, Junction to Case (Note 6) | | $R_{\theta JC}$ | 1.2 | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range | | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|--------------|-----|-------|-----------|------------------|---|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 40 | — | — | V | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 1 | μA | $V_{DS} = 32\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | — | — | ± 100 | nA | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 1 | — | 3 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 1.3 | 1.8 | $\text{m}\Omega$ | $V_{GS} = 10\text{V}, I_D = 25\text{A}$ |
| | | — | 2 | 3.1 | | $V_{GS} = 4.5\text{V}, I_D = 25\text{A}$ |
| Diode Forward Voltage | V_{SD} | — | — | 1.2 | V | $V_{GS} = 0\text{V}, I_S = 20\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C_{iss} | — | 6771 | — | pF | $V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Output Capacitance | C_{oss} | — | 2165 | — | | |
| Reverse Transfer Capacitance | C_{rss} | — | 176 | — | | |
| Gate Resistance | R_G | — | 0.85 | — | Ω | $V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Total Gate Charge ($V_{GS} = 10\text{V}$) | Q_g | — | 116.1 | — | nC | $V_{DD} = 20\text{V}, I_D = 25\text{A}, V_{GS} = 10\text{V}$ |
| Total Gate Charge ($V_{GS} = 4.5\text{V}$) | Q_g | — | 55.2 | — | | |
| Gate-Source Charge | Q_{gs} | — | 20.3 | — | | |
| Gate-Drain Charge | Q_{gd} | — | 22.7 | — | | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 11.4 | — | ns | $V_{DD} = 20\text{V}, V_{GS} = 10\text{V}, I_D = 25\text{A}, R_G = 3\Omega$ |
| Turn-On Rise Time | t_R | — | 22.9 | — | | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 62.5 | — | | |
| Turn-Off Fall Time | t_F | — | 28 | — | | |
| Reverse Recovery Time | t_{RR} | — | 58.6 | — | ns | $I_F = 25\text{A}, di/dt = 100\text{A}/\mu\text{s}$ |
| Reverse Recovery Charge | Q_{RR} | — | 107 | — | 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.

9. Package limited.

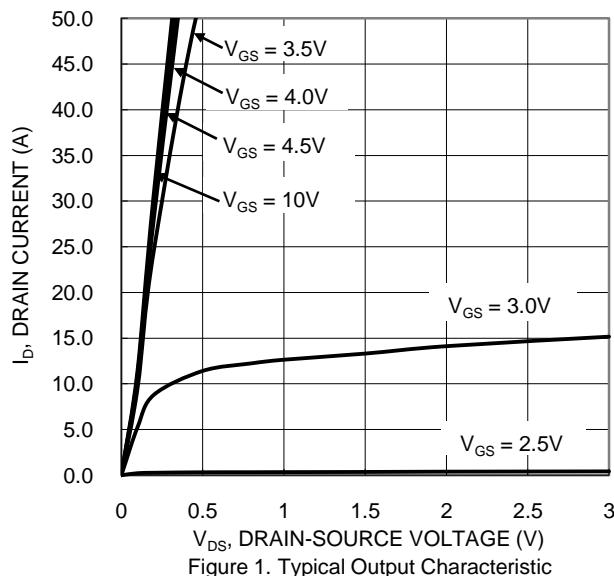


Figure 1. Typical Output Characteristic

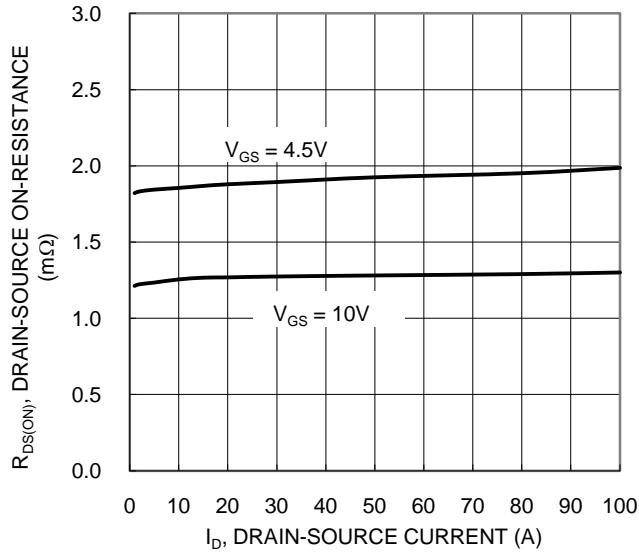


Figure 3. Typical On-Resistance vs Drain Current and Gate Voltage

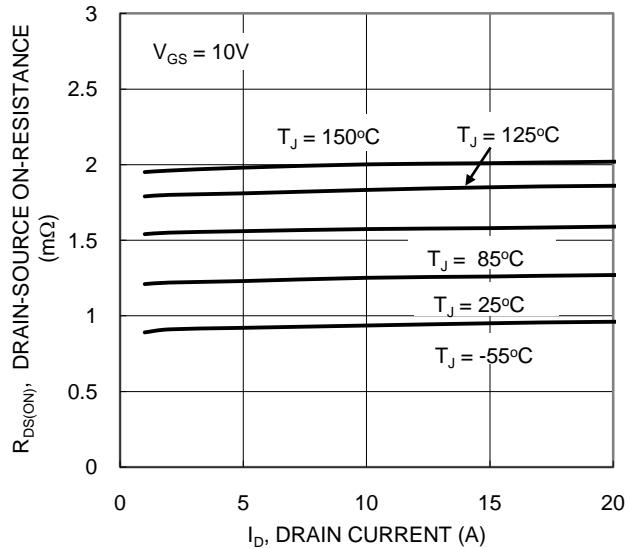


Figure 5. Typical On-Resistance vs Drain Current and Temperature

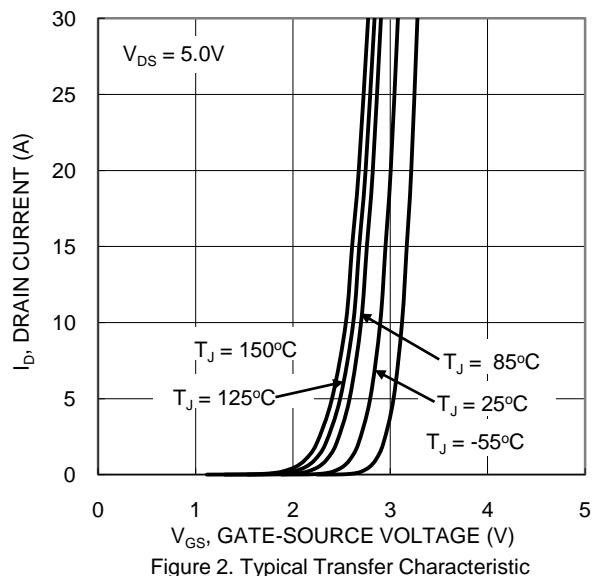


Figure 2. Typical Transfer Characteristic

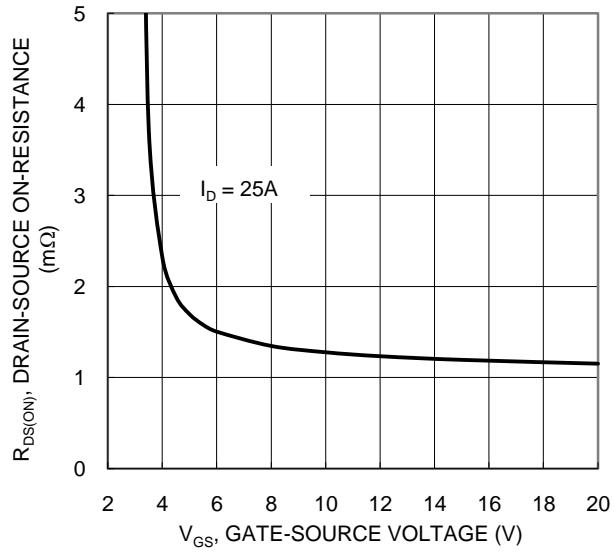


Figure 4. Typical Transfer Characteristic

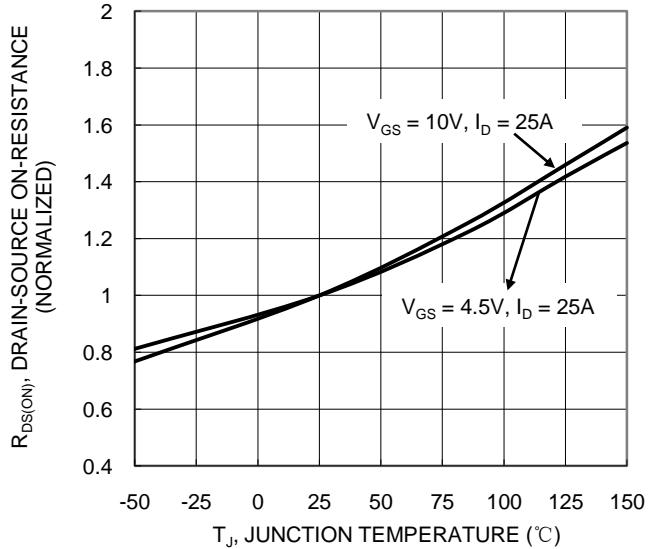
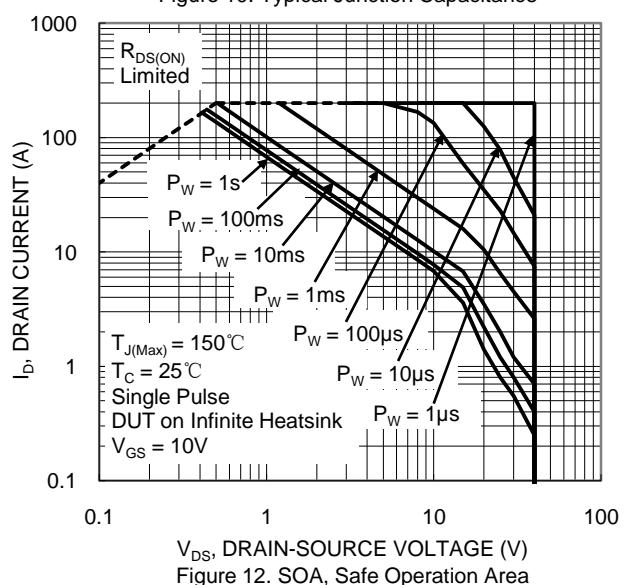
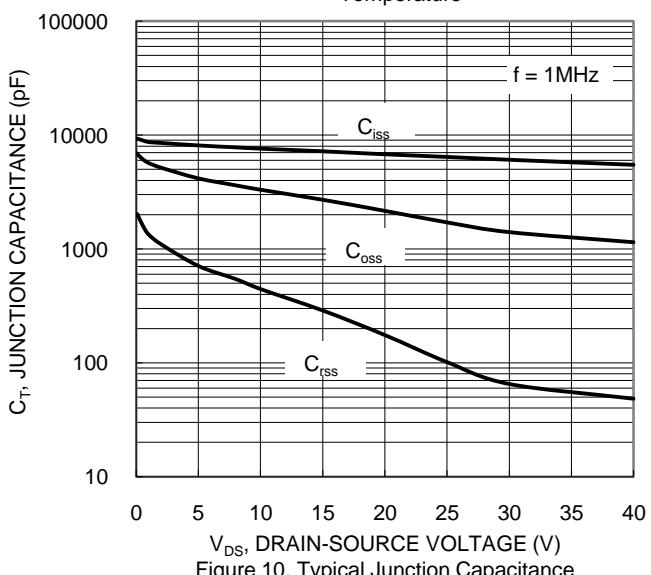
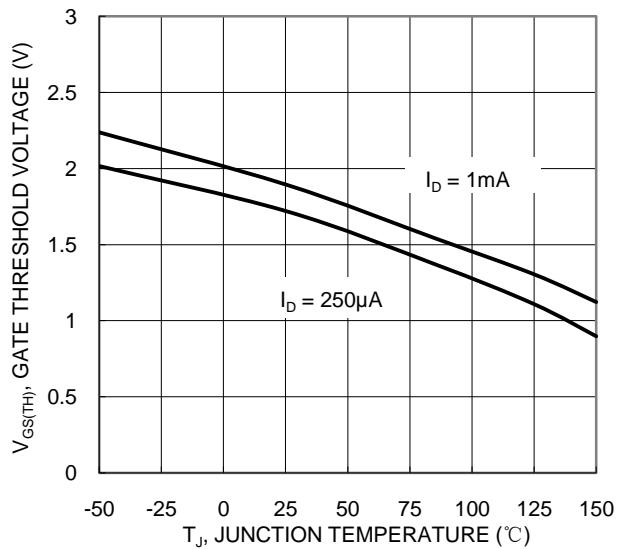
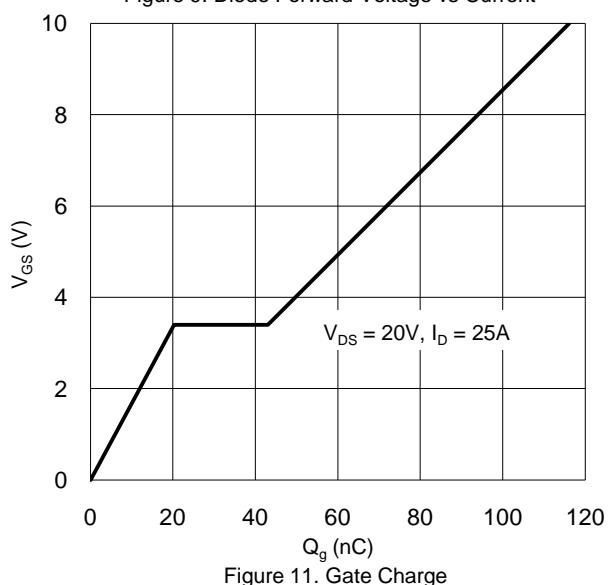
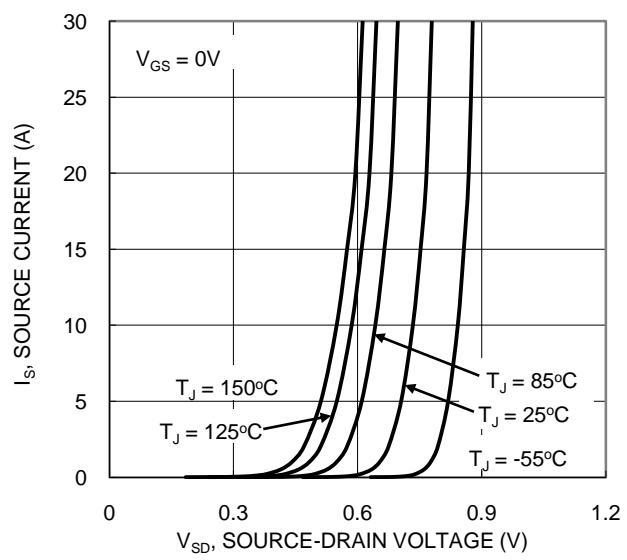
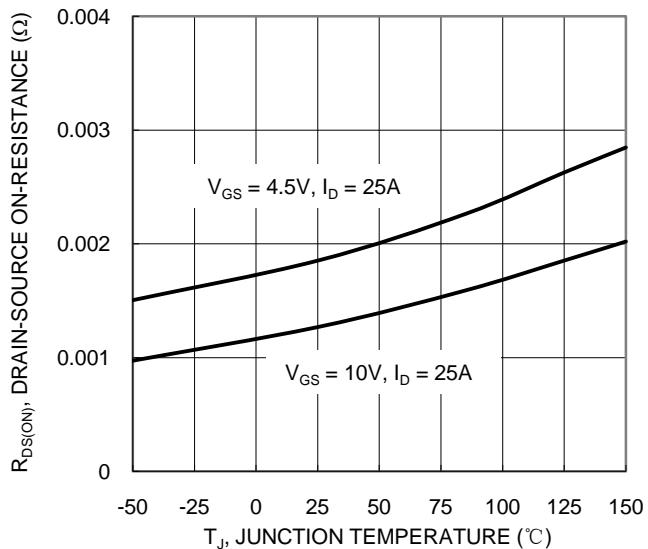


Figure 6. On-Resistance Variation with Temperature



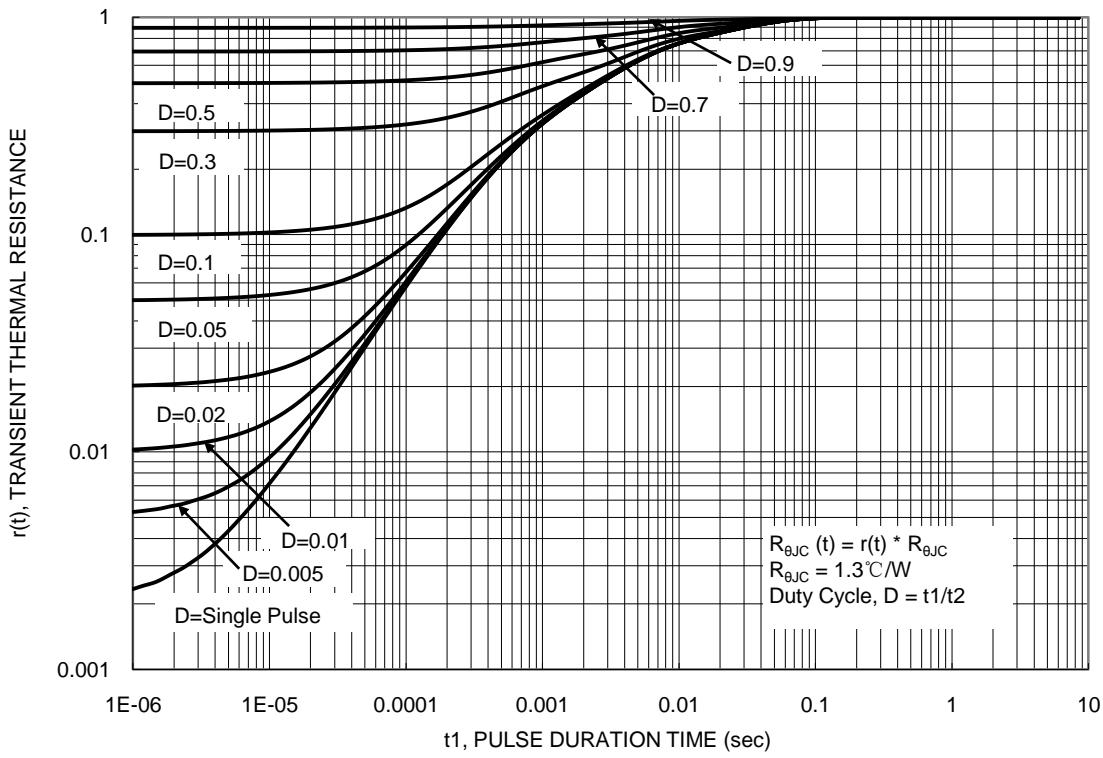
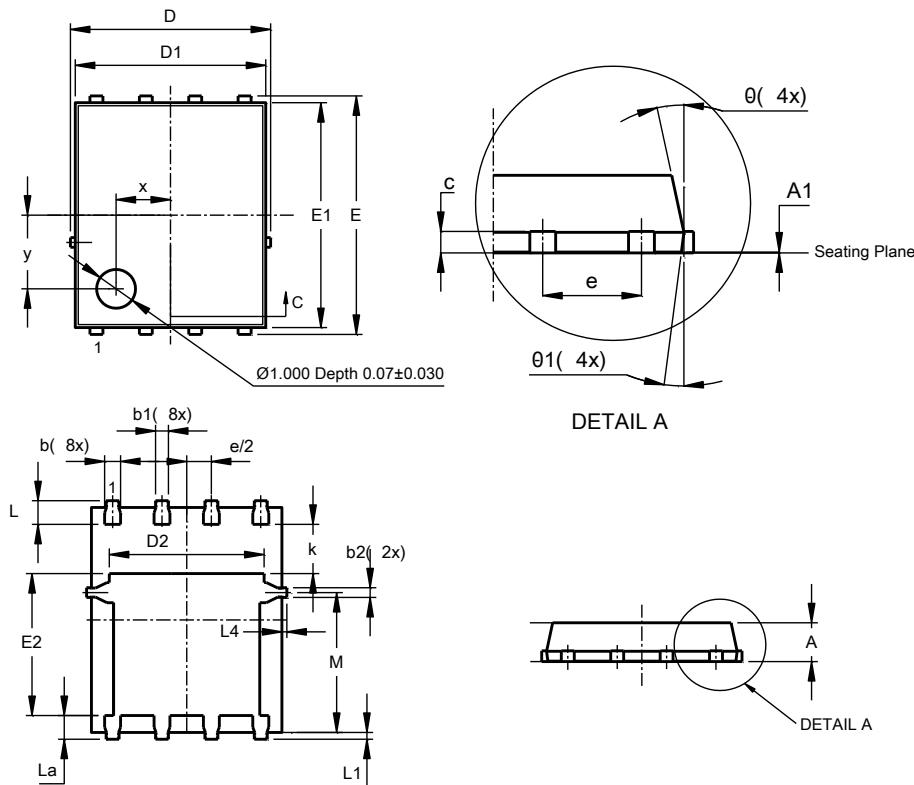


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI5060-8 (Type K)



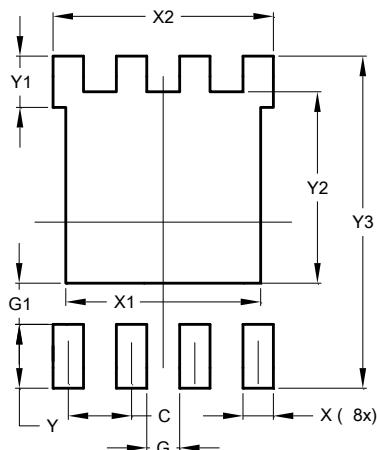
| PowerDI5060-8 (Type K) | | | |
|---------------------------|----------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.90 | 1.10 | 1.00 |
| A1 | 0 | 0.05 | 0.02 |
| b | 0.33 | 0.51 | 0.41 |
| b1 | 0.300 | 0.366 | 0.333 |
| b2 | 0.20 | 0.35 | 0.25 |
| c | 0.23 | 0.33 | 0.277 |
| D | 5.15 BSC | | |
| D1 | 4.85 | 4.95 | 4.90 |
| D2 | - | - | 3.98 |
| E | 6.15 BSC | | |
| E1 | 5.75 | 5.85 | 5.80 |
| E2 | 3.56 | 3.725 | 3.66 |
| E | 1.27BSC | | |
| k | - | - | 1.27 |
| L | 0.51 | 0.71 | 0.61 |
| La | 0.51 | 0.675 | 0.61 |
| L1 | 0.05 | 0.20 | 0.175 |
| L4 | - | - | 0.125 |
| M | 3.50 | 3.71 | 3.605 |
| x | - | - | 1.400 |
| y | - | - | 1.900 |
| 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 (Type K)



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 1.270 |
| G | 0.660 |
| G1 | 0.820 |
| X | 0.610 |
| X1 | 3.910 |
| X2 | 4.420 |
| Y | 1.270 |
| Y1 | 1.020 |
| Y2 | 3.810 |
| Y3 | 6.610 |

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