

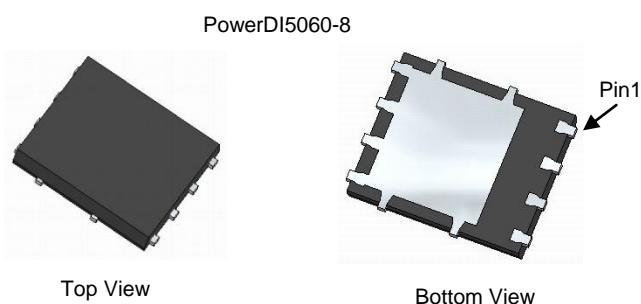
Product Summary

| BV_{DSS} | $R_{DS(ON)}$ Max | I_D $T_C = +25^\circ C$ (Note 9) |
|------------|-------------------------|--|
| 60V | 3.1mΩ @ $V_{GS} = 10V$ | 100A |
| | 4.5mΩ @ $V_{GS} = 4.5V$ | 100A |

Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AECQ101, supported by a PPAP and is ideal for use in:

- Primary Switch in Isolated DC-DC
- Synchronous Rectifier
- Load Switch

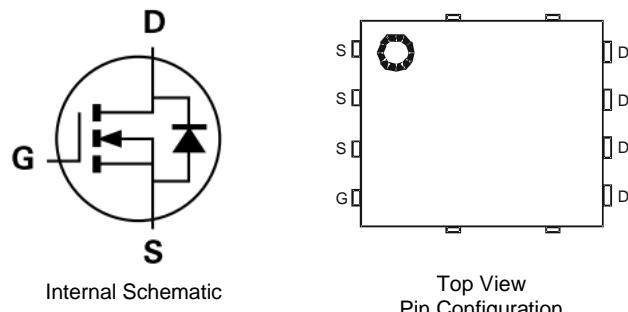


Features

- Rated to $+175^\circ C$ – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low $R_{DS(ON)}$ – Minimizes Power Losses
- Low Q_g – Minimizes Switching Losses
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

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 Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.097 grams (Approximate)



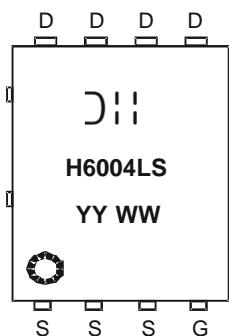
Ordering Information (Note 5)

| Part Number | Case | Packaging |
|-----------------|---------------|---------------------|
| DMTH6004LPSQ-13 | PowerDI5060-8 | 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to http://www.diodes.com/product_compliance_definitions.html.
5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



DII = Manufacturer's Marking
H6004LS = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 16 = 2016)
WW = Week (01 to 53)

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

| Characteristic | Symbol | Value | Unit | |
|--|---|----------|-------------|---|
| Drain-Source Voltage | V_{DSS} | 60 | V | |
| Gate-Source Voltage | V_{GSS} | ± 20 | V | |
| Continuous Drain Current (Note 6) | $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$ | I_D | 22 16 | A |
| Continuous Drain Current (Note 7) | $T_C = +25^\circ\text{C}$ $T_C = +100^\circ\text{C}$ (Note 8) | I_D | 100 100 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | I_S | 100 | A | |
| Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%) | I_{DM} | 120 | A | |
| Avalanche Current, $L = 0.2\text{mH}$ | I_{AS} | 40 | A | |
| Avalanche Energy, $L = 0.2\text{mH}$ | E_{AS} | 160 | mJ | |

Thermal Characteristic

| Characteristic | Symbol | Value | Unit | |
|--|---------------------------|-------------|---------------------------|---|
| Total Power Dissipation (Note 6) | $T_A = +25^\circ\text{C}$ | P_D | 2.6 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | 47 | $^\circ\text{C}/\text{W}$ | |
| Total Power Dissipation (Note 7) | $T_C = +25^\circ\text{C}$ | P_D | 138 | W |
| Thermal Resistance, Junction to Case (Note 7) | $R_{\theta JC}$ | 0.9 | $^\circ\text{C}/\text{W}$ | |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +175 | $^\circ\text{C}$ | |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|--------------|-----|------|-----------|------------------|---|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 60 | - | - | V | $V_{GS} = 0\text{V}, I_D = 1\text{mA}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | - | - | 1 | μA | $V_{DS} = 48\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | - | - | ± 100 | nA | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 1 | - | 3 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | - | 2.5 | 3.1 | $\text{m}\Omega$ | $V_{GS} = 10\text{V}, I_D = 25\text{A}$ |
| | | - | 3.3 | 4.5 | $\text{m}\Omega$ | $V_{GS} = 4.5\text{V}, I_D = 20\text{A}$ |
| Diode Forward Voltage | V_{SD} | - | - | 1.3 | V | $V_{GS} = 0\text{V}, I_S = 25\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C_{iss} | - | 5399 | - | pF | $V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Output Capacitance | C_{oss} | - | 1306 | - | | |
| Reverse Transfer Capacitance | C_{rss} | - | 92 | - | | |
| Gate Resistance | R_g | - | 0.64 | - | 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 | - | 78.3 | - | nC | $V_{DD} = 30\text{V}, I_D = 25\text{A}$ |
| Total Gate Charge ($V_{GS} = 4.5\text{V}$) | Q_g | - | 38.5 | - | | |
| Gate-Source Charge | Q_{gs} | - | 10.2 | - | | |
| Gate-Drain Charge | Q_{gd} | - | 20.4 | - | | |
| Turn-On Delay Time | $t_{D(ON)}$ | - | 9.9 | - | ns | $V_{DD} = 30\text{V}, V_{GS} = 10\text{V}, I_D = 25\text{A}, R_g = 3.5\Omega$ |
| Turn-On Rise Time | t_R | - | 17.7 | - | | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | - | 53.5 | - | | |
| Turn-Off Fall Time | t_F | - | 32.9 | - | | |
| Body Diode Reverse Recovery Time | t_{RR} | - | 49.7 | - | ns | $I_F = 25\text{A}, di/dt = 100\text{A}/\mu\text{s}$ |
| Body Diode Reverse Recovery Charge | Q_{RR} | - | 78.9 | - | nC | |

Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.

7. Thermal resistance from junction to soldering point (on the exposed drain pad).

8. Short duration pulse test used to minimize self-heating effect.

9. Guaranteed by design. Not subject to production testing.

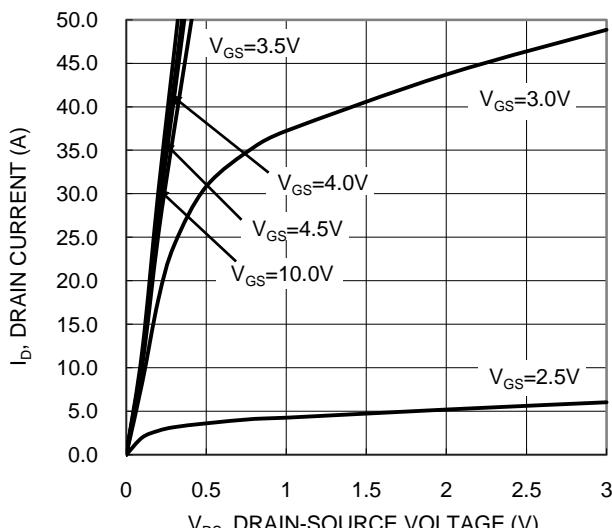


Figure 1. Typical Output Characteristic

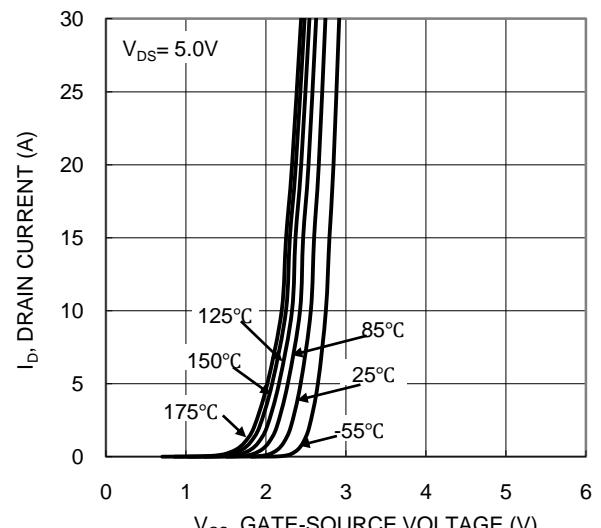


Figure 2. Typical Transfer Characteristic

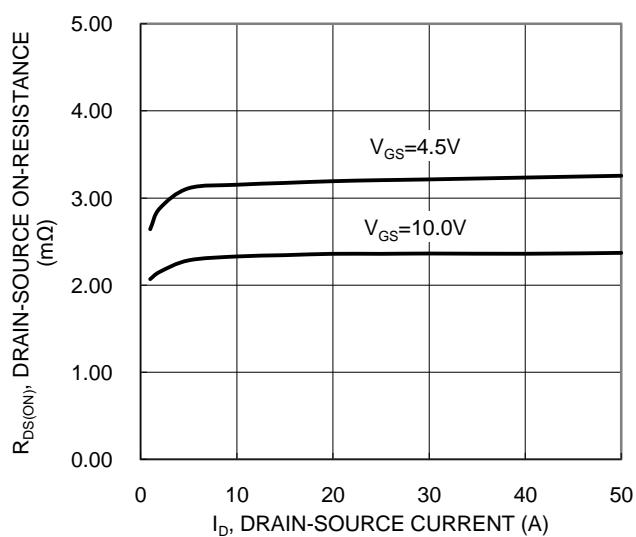


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

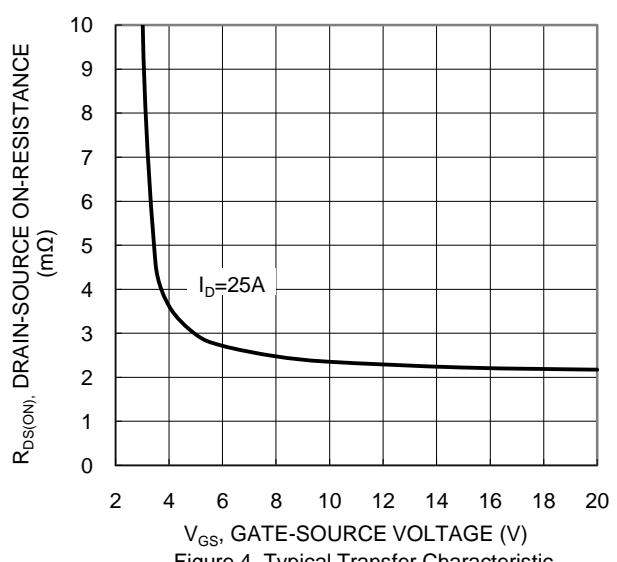


Figure 4. Typical Transfer Characteristic

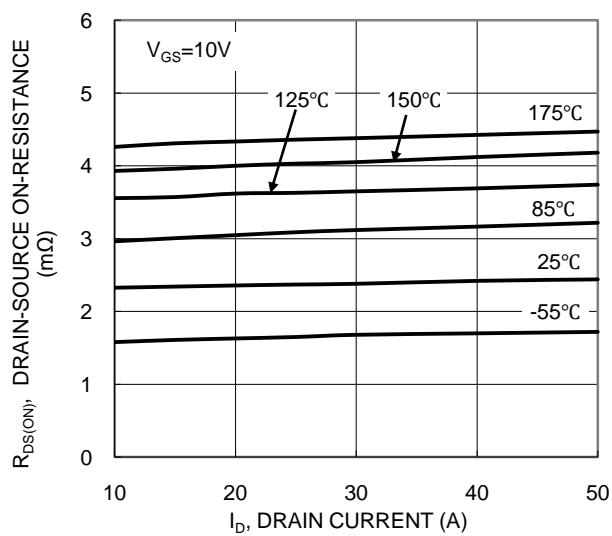


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

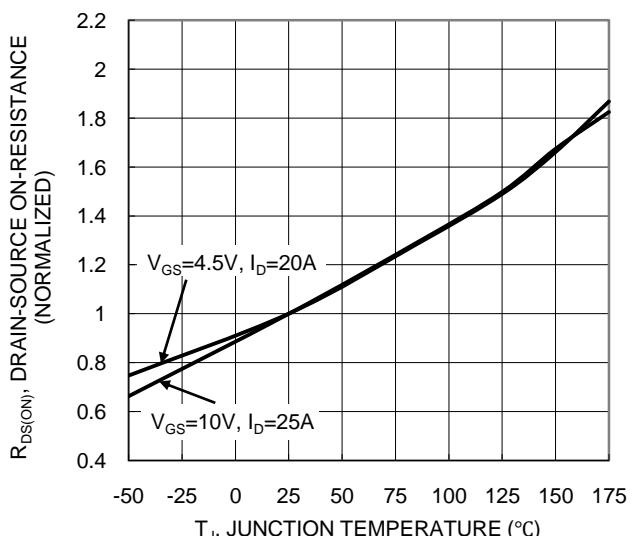
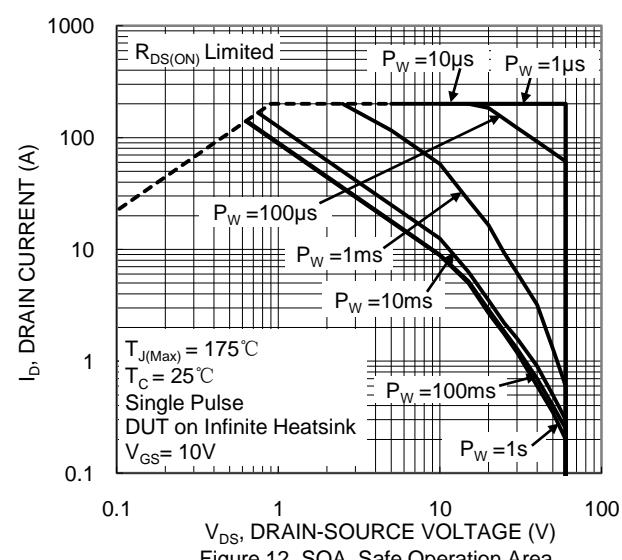
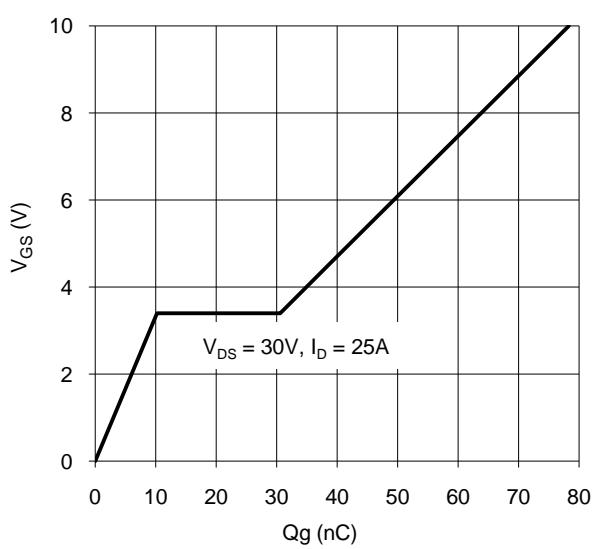
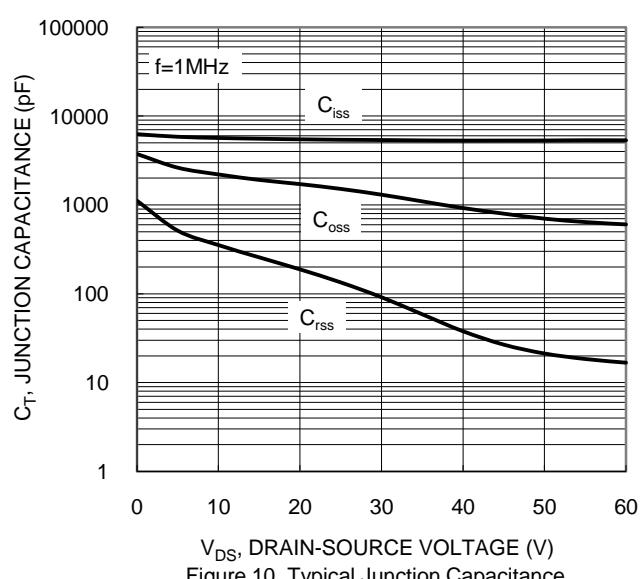
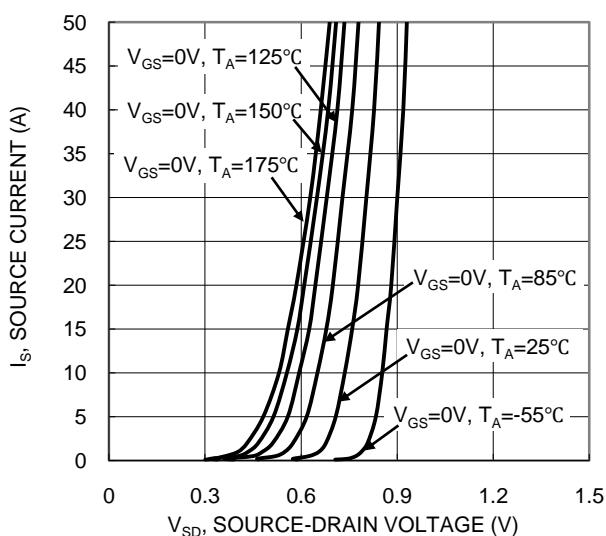
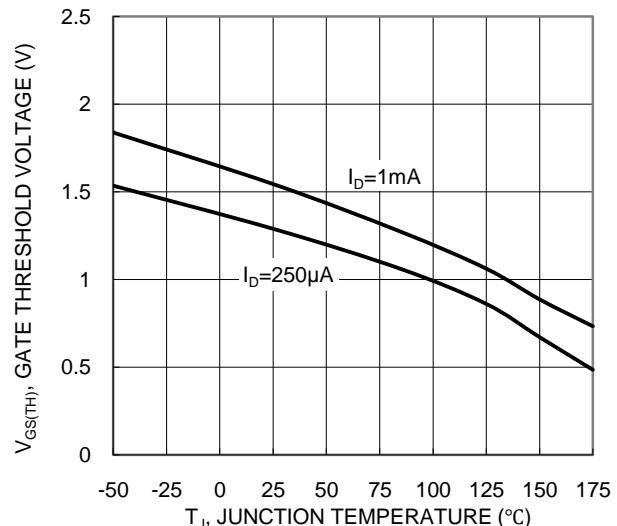
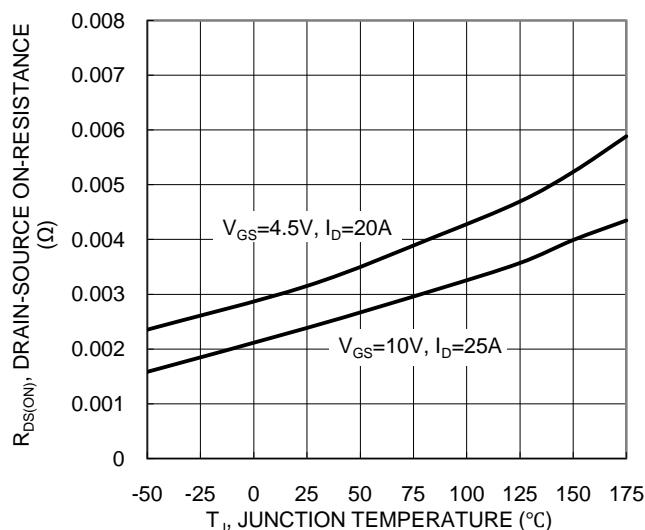


Figure 6. On-Resistance Variation with Temperature



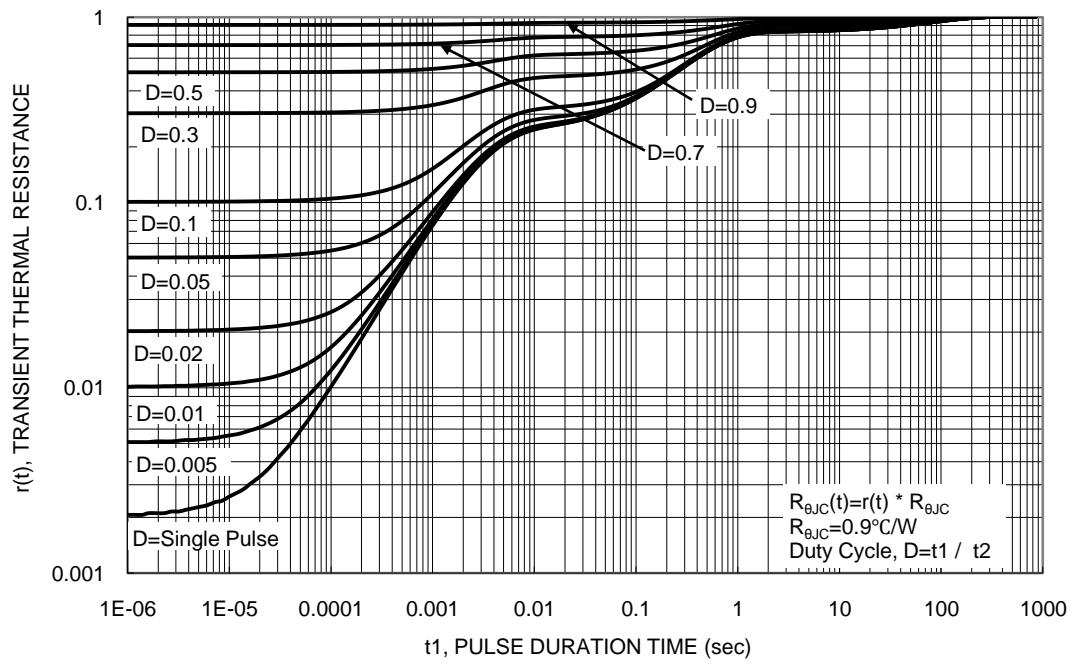
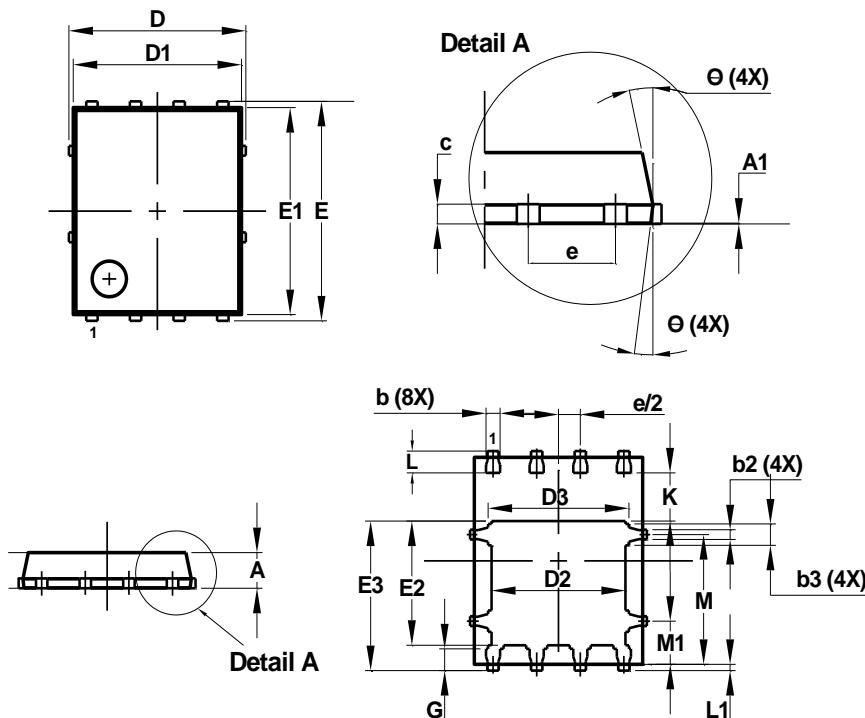


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI5060-8

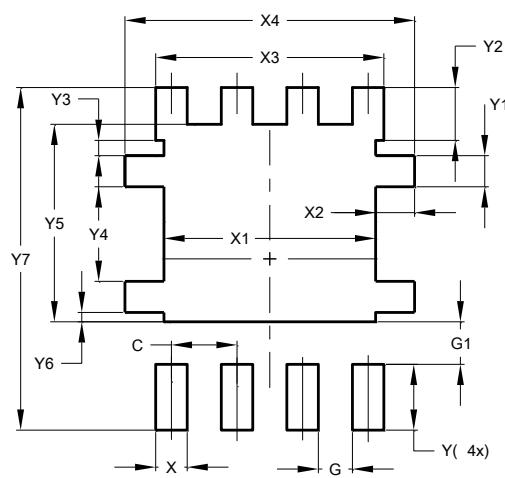


| PowerDI5060-8 | | | |
|----------------------|----------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.90 | 1.10 | 1.00 |
| A1 | 0.00 | 0.05 | — |
| b | 0.33 | 0.51 | 0.41 |
| b2 | 0.200 | 0.350 | 0.273 |
| b3 | 0.40 | 0.80 | 0.60 |
| c | 0.230 | 0.330 | 0.277 |
| D | 5.15 BSC | | |
| D1 | 4.70 | 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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