



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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企业微信二维码



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Product Summary

| BV_{DSS} | $R_{DS(ON)}$ Max | I_D $T_C = +25^\circ C$ |
|------------|--------------------------------|------------------------------|
| 100V | 8.6m Ω @ $V_{GS} = 10V$ | 98.4A |

Description

This new generation N-Channel Enhancement Mode MOSFET is designed to minimize $R_{DS(ON)}$, yet maintain superior switching performance. This device is ideal for use in notebook battery power management and load switch.

Applications

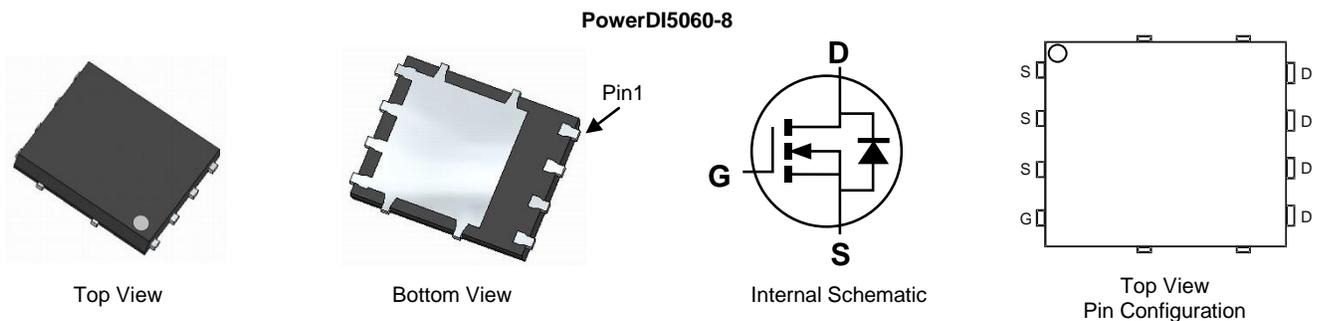
- Motor Control
- DC-DC Converters
- Power Management

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low $R_{DS(ON)}$ – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed
- <1.1mm Package Profile – Ideal for Thin Applications

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 Connections: See Diagram Below
- Terminal Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Weight: 0.097 grams (Approximate)



Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|---|--------------|---|------------------|--------------|------|
| Drain-Source Voltage | | | V _{DSS} | 100 | V |
| Gate-Source Voltage | | | V _{GSS} | ±20 | V |
| Continuous Drain Current (V _{GS} = 10V) | Steady State | T _A = +25°C T _A = +100°C | I _D | 10.8 7.6 | A |
| | Steady State | T _C = +25°C T _C = +100°C | I _D | 98.4 69.6 | A |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) | | | I _{DM} | 250 | A |
| Maximum Continuous Body Diode Forward Current | | | I _S | 95 | A |
| Pulsed Body Diode Forward Current (10μs Pulse, Duty Cycle = 1%) | | | I _{SM} | 250 | A |
| Avalanche Current, L=0.3mH | | | I _{AS} | 15 | A |
| Avalanche Energy, L=0.3mH | | | E _{AS} | 33.7 | mJ |

Thermal Characteristics

| Characteristic | | | Symbol | Value | Unit |
|--|--|------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5) | | | P _D | 1.5 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | | Steady State | R _{θJA} | 99 | °C/W |
| Total Power Dissipation | | T _C = +25°C | P _D | 125 | W |
| Thermal Resistance, Junction to Case | | | R _{θJC} | 1.2 | °C/W |
| Operating and Storage Temperature Range | | | T _J , T _{STG} | -55 to +175 | °C |

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------------|-----|------|------|------|--|
| OFF CHARACTERISTICS (Note 6) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 100 | — | — | V | V _{GS} = 0V, I _D = 1mA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | μA | V _{DS} = 80V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 1.4 | 1.9 | 3 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 6.9 | 8.6 | mΩ | V _{GS} = 10V, I _D = 13A |
| | | — | 7.5 | 12 | | V _{GS} = 6V, I _D = 13A |
| | | — | 10 | 20 | | V _{GS} = 4.5V, I _D = 5A |
| Diode Forward Voltage | V _{SD} | — | 0.8 | 1.3 | V | V _{GS} = 0V, I _S = 13A |
| DYNAMIC CHARACTERISTICS (Note 7) | | | | | | |
| Input Capacitance | C _{iSS} | — | 2592 | — | pF | V _{DS} = 50V, V _{GS} = 0V f = 1MHz |
| Output Capacitance | C _{oSS} | — | 792 | — | | |
| Reverse Transfer Capacitance | C _{rSS} | — | 45 | — | | |
| Gate Resistance | R _g | — | 2 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge | Q _g | — | 53.7 | — | nC | V _{DD} = 50V, I _D = 13A, V _{GS} = 10V |
| Gate-Source Charge | Q _{gs} | — | 10.6 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 8.2 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 11.6 | — | ns | V _{DD} = 50V, V _{GS} = 10V, I _D = 13A, R _g = 6Ω |
| Turn-On Rise Time | t _r | — | 14.1 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 42.9 | — | | |
| Turn-Off Fall Time | t _f | — | 22 | — | | |
| Reverse Recovery Time | t _{RR} | — | 49.8 | — | ns | I _f = 13A, di/dt = 100A/μs |
| Reverse Recovery Charge | Q _{RR} | — | 85.1 | — | nC | |

- Notes: 5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 6. Short duration pulse test used to minimize self-heating effect.
 7. Guaranteed by design. Not subject to product testing.

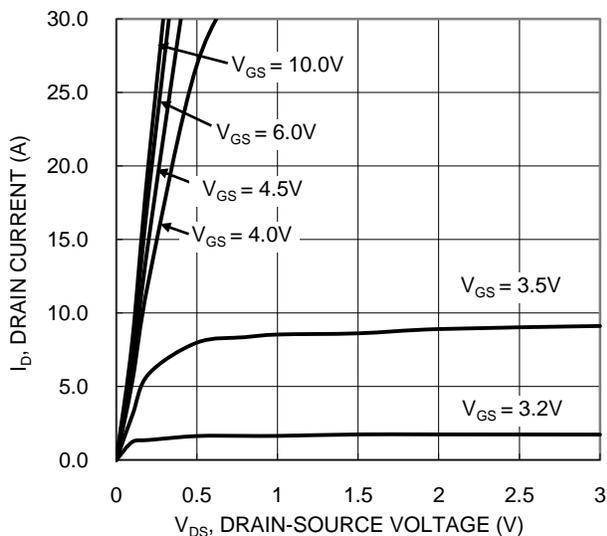


Figure 1. Typical Output Characteristic

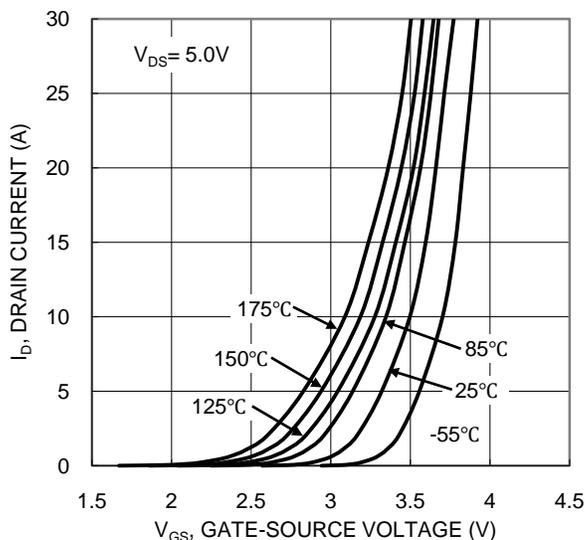


Figure 2. Typical Transfer Characteristic

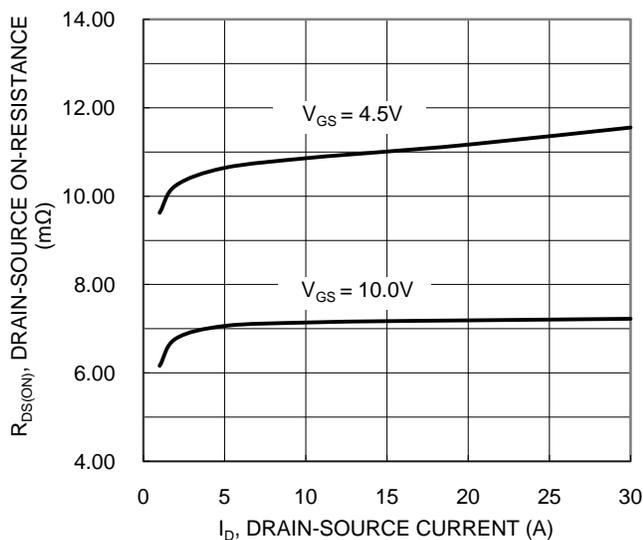


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

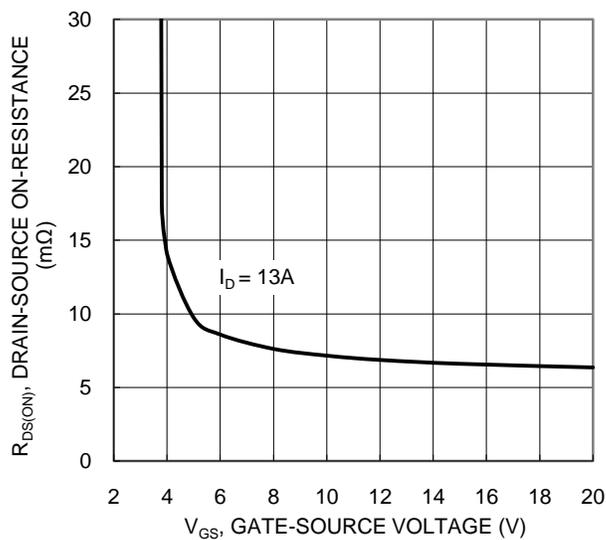


Figure 4. Typical Transfer Characteristic

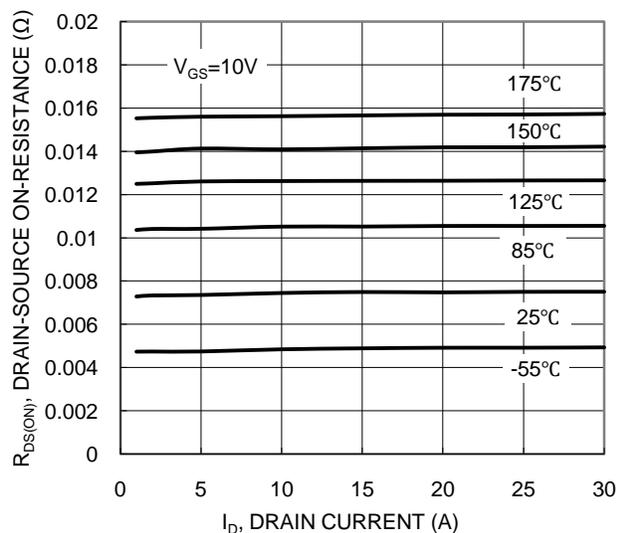


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

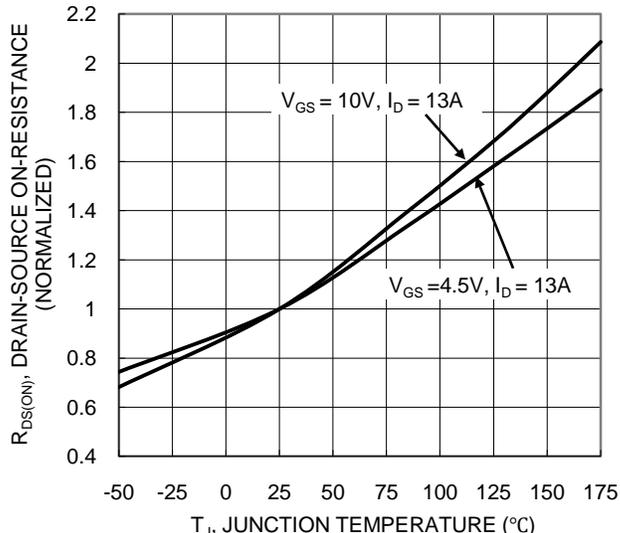


Figure 6. On-Resistance Variation with Temperature

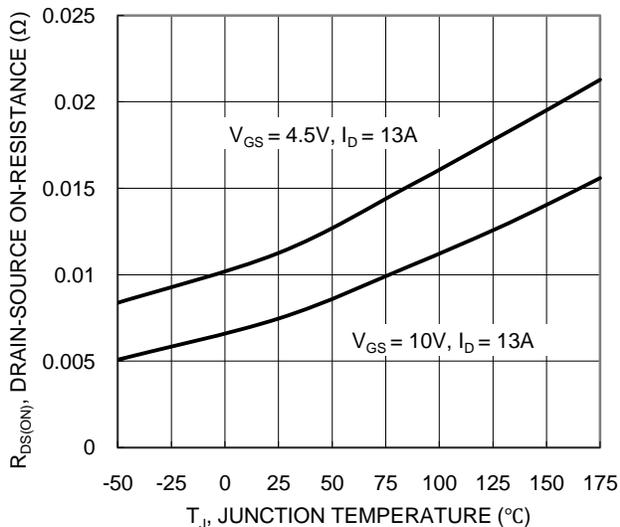


Figure 7. On-Resistance Variation with Temperature

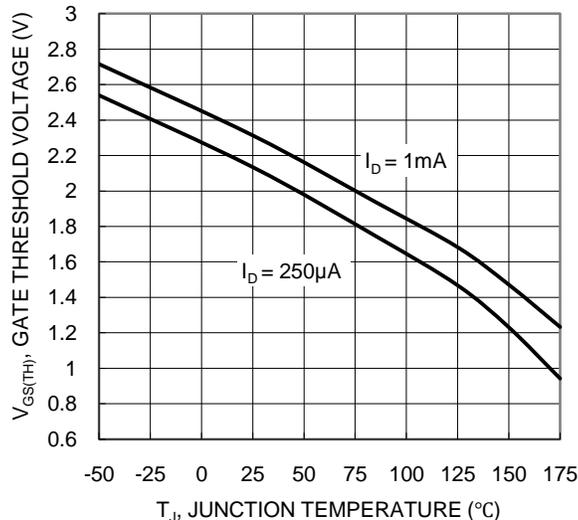


Figure 8. Gate Threshold Variation vs. Junction Temperature

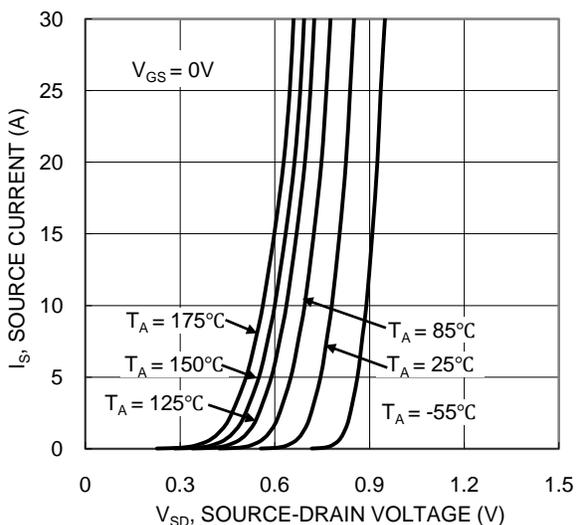


Figure 9. Diode Forward Voltage vs. Current

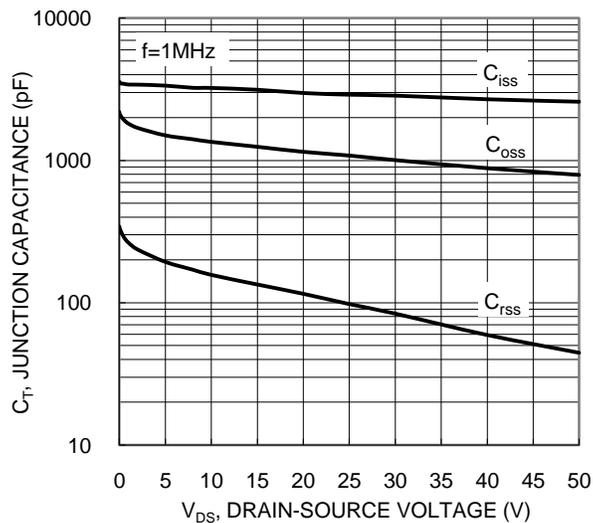


Figure 10. Typical Junction Capacitance

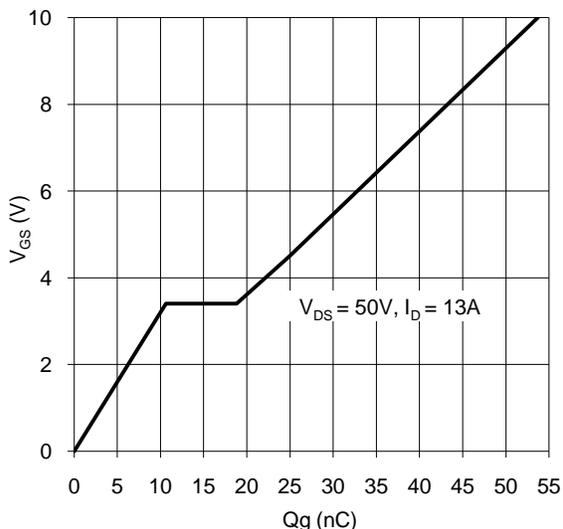


Figure 11. Gate Charge

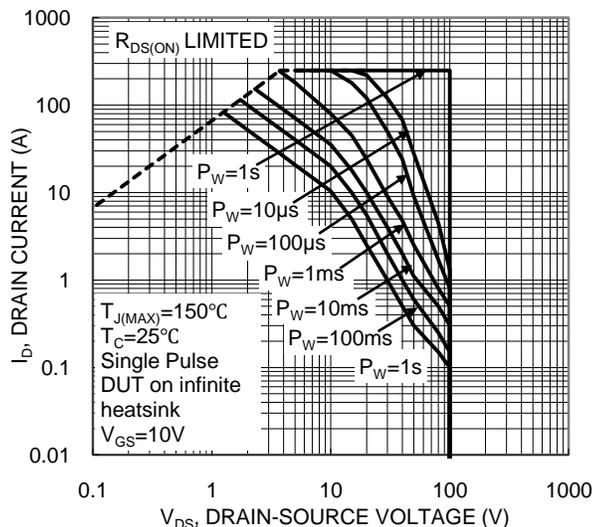


Figure 12. SOA, Safe Operation Area

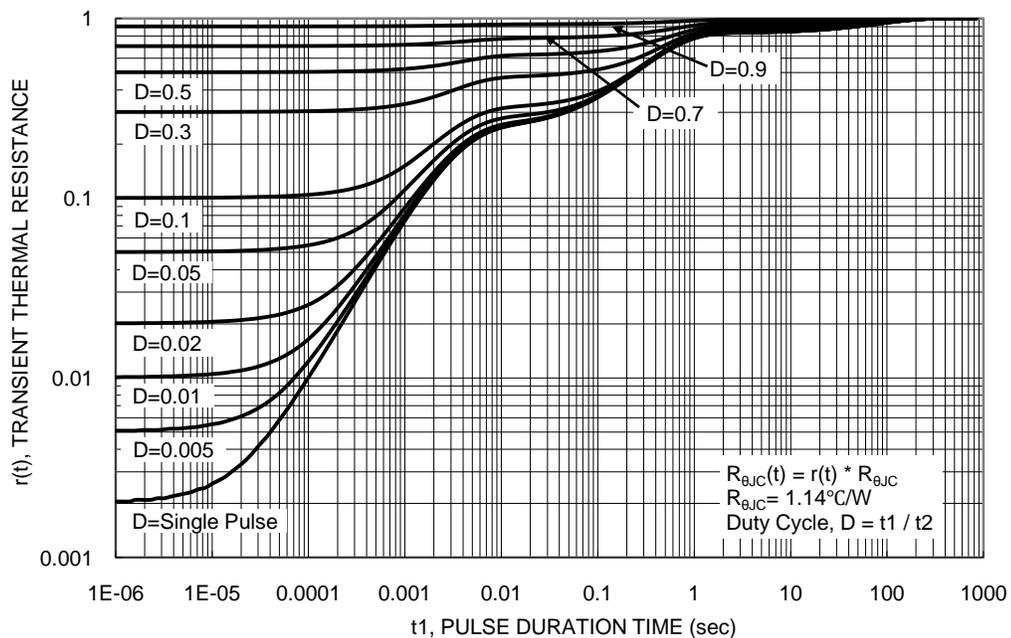
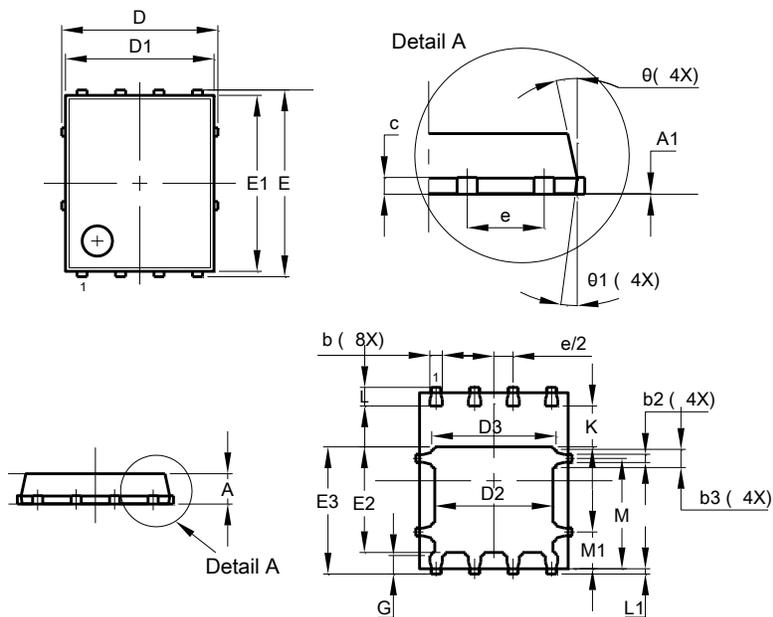
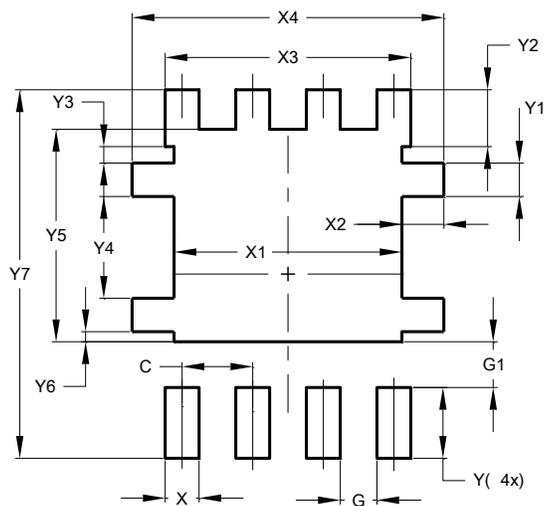


Figure 13. Transient Thermal Resistance

Package Outline Dimensions
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
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 |