

Product Summary

| BV_{DSS} | $R_{DS(ON)}$ MAX | $I_{D\ MAX}$ $T_C = +25^\circ C$ |
|------------|--------------------------------|-------------------------------------|
| 60V | 6.2m Ω @ $V_{GS} = 10V$ | 98A |

Description

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

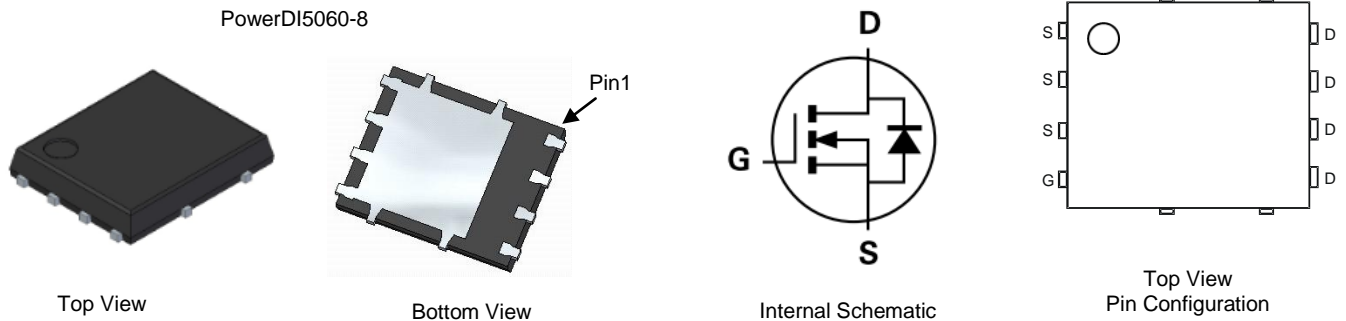
- Synchronous Rectifier
- DC-DC Converters
- Power Management

Features

- 100% Unclamped Inductive Switching (UIS) Test in Production—Ensures More Reliable and Robust End Application
- High Conversion Efficiency
- Low $R_{DS(ON)}$ —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)**

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)

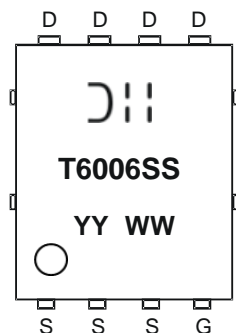


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|---------------|------------------|
| DMT6006SPS-13 | PowerDI5060-8 | 2500/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



= Manufacturer's Marking
 T6006SS = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 19 = 2019)
 WW = Week Code (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 5) $V_{GS} = 10\text{V}$ | I_D | $T_A = +25^\circ\text{C}$ | 16.2 |
| | | $T_A = +70^\circ\text{C}$ | 13.0 |
| Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$ | I_D | $T_C = +25^\circ\text{C}$ | 98.0 |
| | | $T_C = +70^\circ\text{C}$ | 78.4 |
| Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%) | I_{DM} | 390 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | I_S | 98 | A |
| Pulsed Body Diode Forward Current (10 μs Pulse, Duty Cycle = 1%) | I_{SM} | 390 | A |
| Avalanche Current, $L = 0.3\text{mH}$ | I_{AS} | 24.2 | A |
| Avalanche Energy, $L = 0.3\text{mH}$ | E_{AS} | 87.9 | mJ |

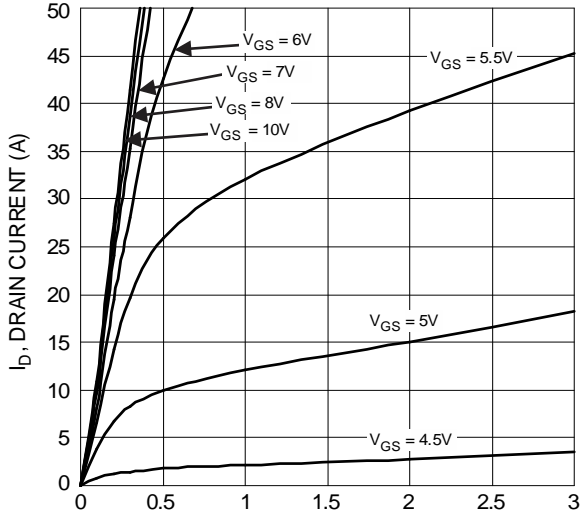
Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------------|--------------------|
| Total Power Dissipation (Note 5) $T_A = +25^\circ\text{C}$ | P_D | 2.45 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 51 | $^\circ\text{C/W}$ |
| Total Power Dissipation (Note 6) $T_C = +25^\circ\text{C}$ | P_D | 89.3 | W |
| Thermal Resistance, Junction to Case (Note 6) | $R_{\theta JC}$ | 1.4 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

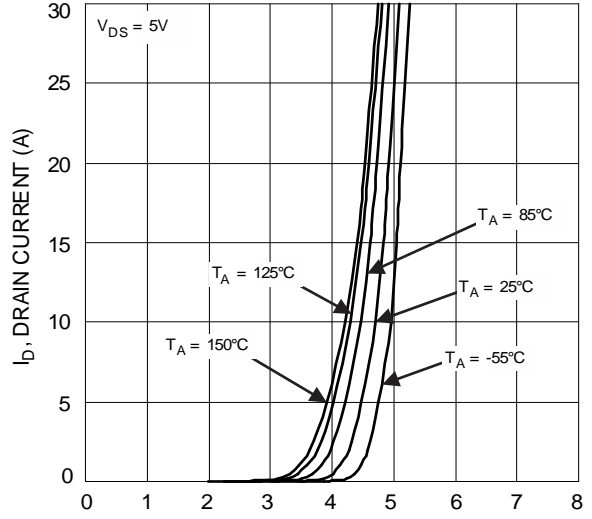
Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------|-----|------|-----------|---------------|---|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 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 | $V_{GS} = 20\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 2 | — | 4 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 4.8 | 6.2 | m Ω | $V_{GS} = 10\text{V}, I_D = 10.5\text{A}$ |
| Diode Forward Voltage | V_{SD} | — | 0.8 | 1.2 | V | $V_{GS} = 0\text{V}, I_S = 21\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C_{ISS} | — | 1721 | — | pF | $V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Output Capacitance | C_{OSS} | — | 740 | — | | |
| Reverse Transfer Capacitance | C_{RSS} | — | 49 | — | | |
| Gate Resistance | R_g | — | 0.6 | — | Ω | $V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Total Gate Charge | Q_g | — | 27.9 | — | nC | $V_{DS} = 30\text{V}, I_D = 21\text{A}, V_{GS} = 10\text{V}$ |
| Gate-Source Charge | Q_{gs} | — | 7.4 | — | | |
| Gate-Drain Charge | Q_{gd} | — | 7.3 | — | | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 7.5 | — | ns | $V_{DD} = 30\text{V}, V_{GS} = 10\text{V}, I_D = 10.5\text{A}, R_g = 4.7\Omega$ |
| Turn-On Rise Time | t_r | — | 8.2 | — | | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 16.5 | — | | |
| Turn-Off Fall Time | t_f | — | 9.8 | — | | |
| Reverse Recovery Time | t_{RR} | — | 37.0 | — | ns | $I_F = 21\text{A}, di/dt = 300\text{A}/\mu\text{s}$ |
| Reverse Recovery Charge | Q_{RR} | — | 42.9 | — | nC | |

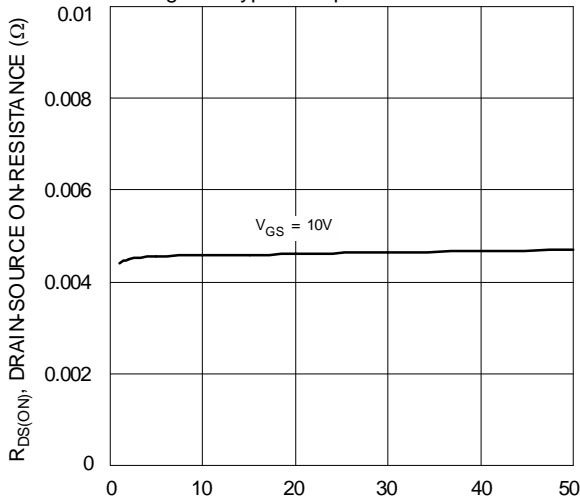
- Notes:
- Device mounted on FR-4 substrate PCB, 2oz copper, with 1inch square copper plate.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.



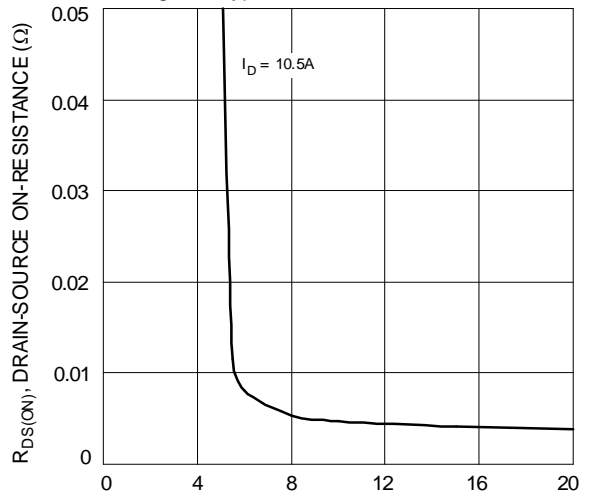
V_{DS} , DRAIN-SOURCE VOLTAGE (V)
Figure 1 Typical Output Characteristic



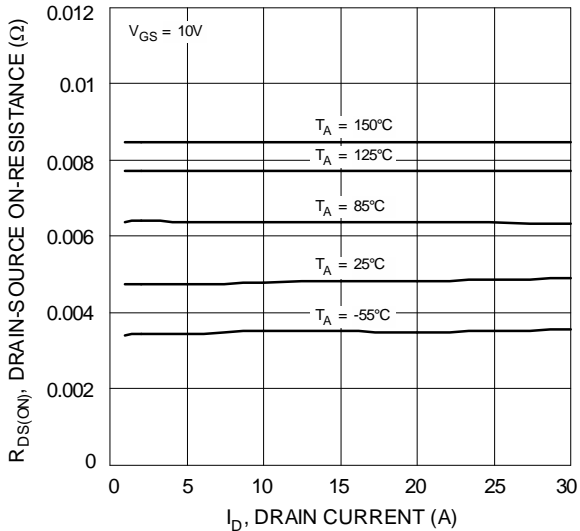
V_{GS} , GATE-SOURCE VOLTAGE (V)
Figure 2 Typical Transfer Characteristics



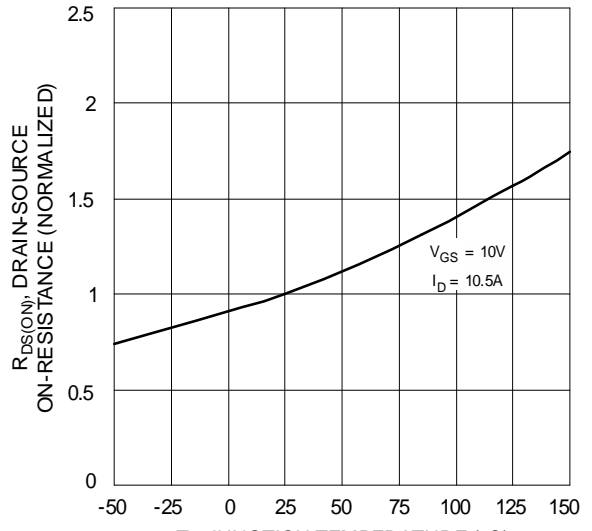
I_D , DRAIN-SOURCE CURRENT (A)
Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage



V_{GS} , GATE-SOURCE VOLTAGE (V)
Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage



I_D , DRAIN CURRENT (A)
Figure 5 Typical On-Resistance vs. Drain Current and Temperature



T_J , JUNCTION TEMPERATURE ($^{\circ}C$)
Figure 6 On-Resistance Variation with Temperature

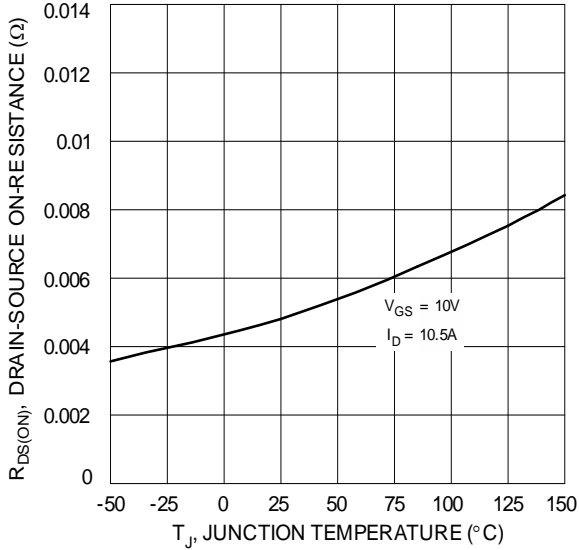


Figure 7 On-Resistance Variation with Temperature

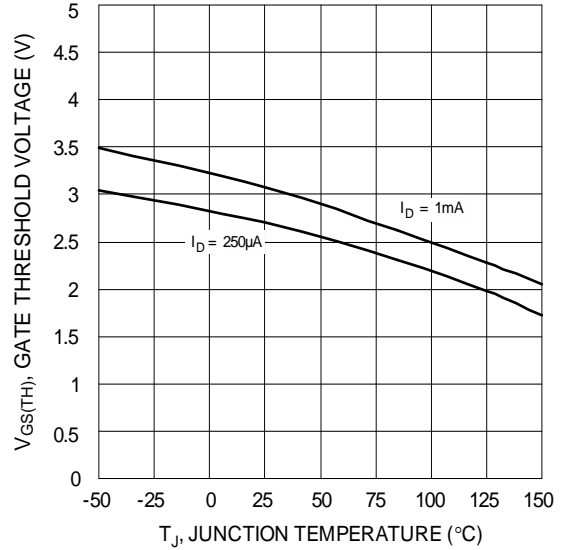


Figure 8 Gate Threshold Variation vs. Junction Temperature

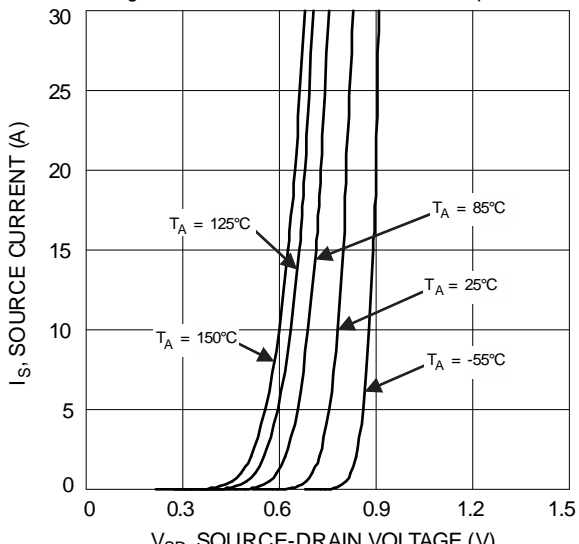


Figure 9 Diode Forward Voltage vs. Current

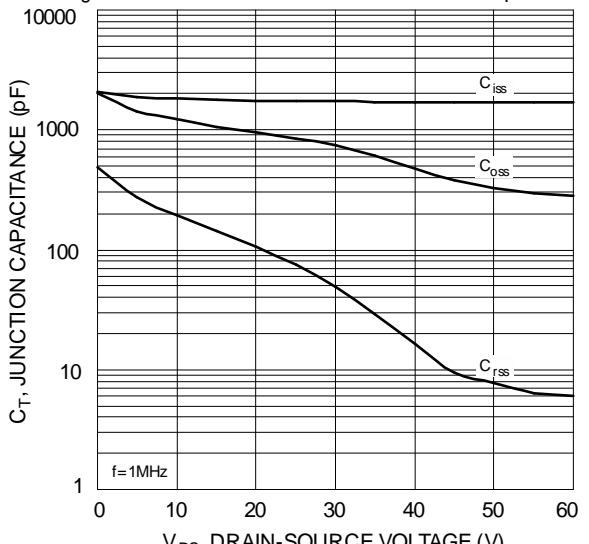


Figure 10 Typical Junction Capacitance

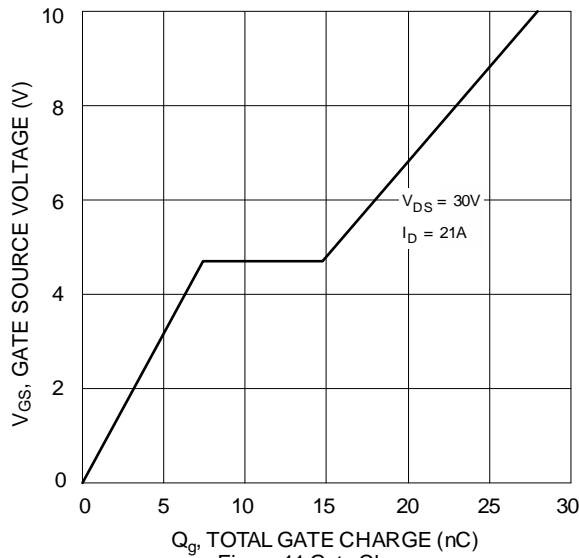


Figure 11 Gate Charge

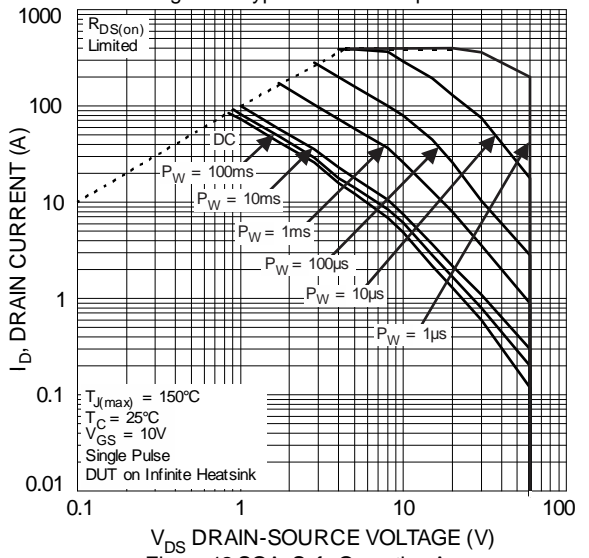
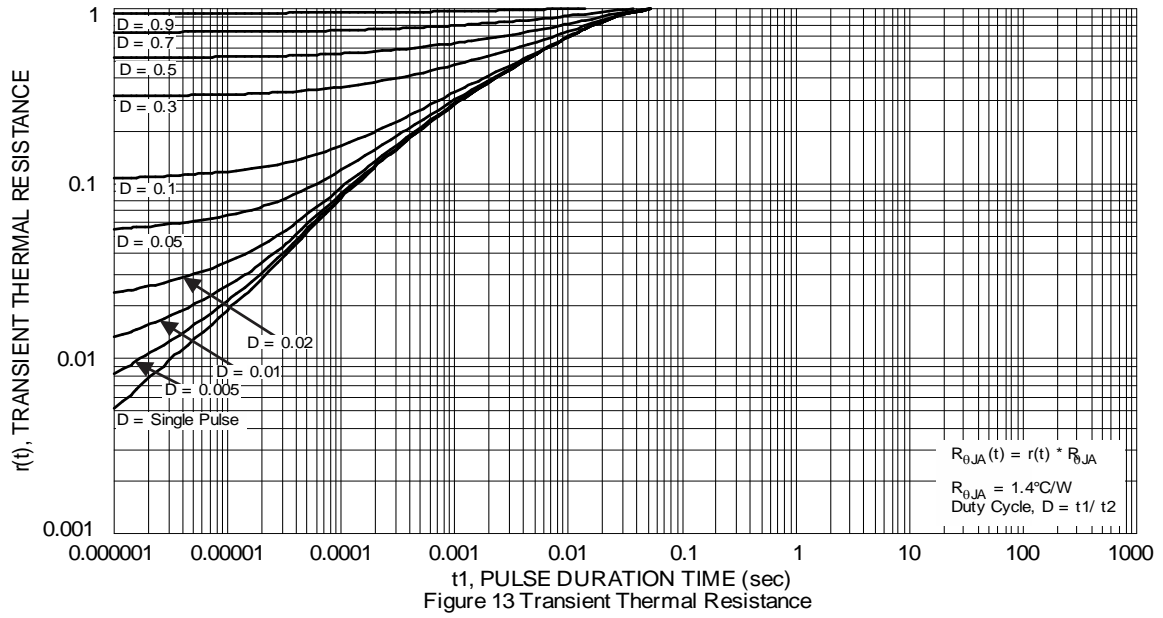


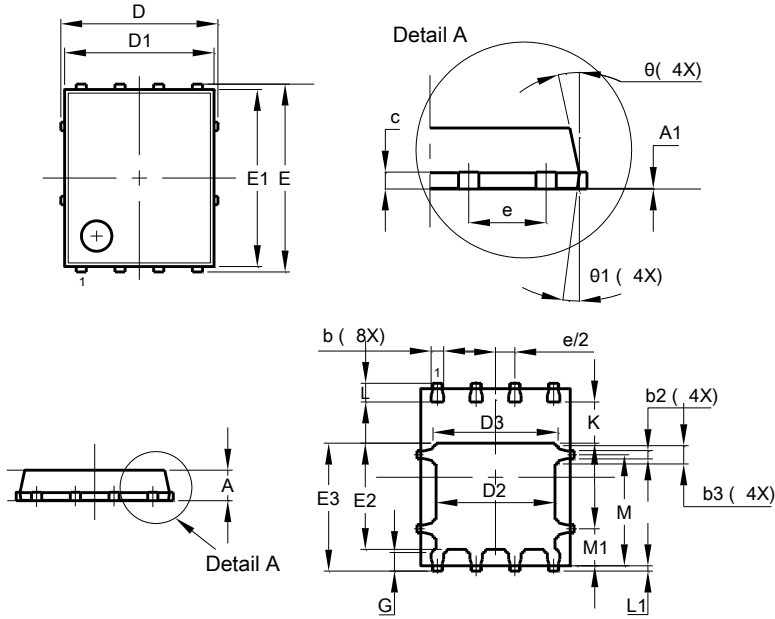
Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

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

PowerDI5060-8

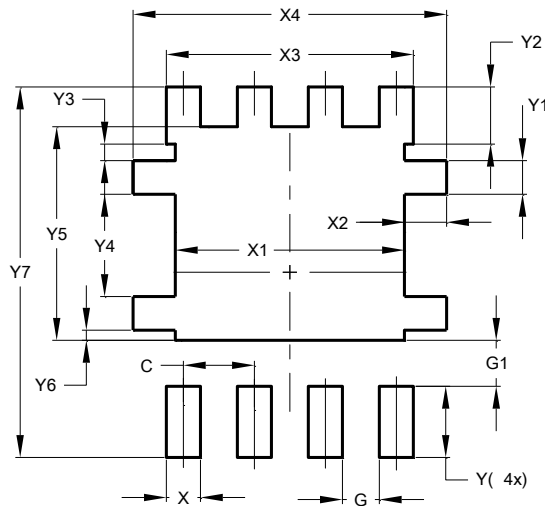


| PowerDI5060-8 | | | |
|----------------------|----------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.90 | 1.10 | 1.00 |
| A1 | 0.00 | 0.05 | - |
| b | 0.33 | 0.51 | 0.41 |
| b2 | 0.200 | 0.350 | 0.273 |
| b3 | 0.40 | 0.80 | 0.60 |
| c | 0.230 | 0.330 | 0.277 |
| D | 5.15 BSC | | |
| D1 | 4.70 | 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° |
| θ_1 | 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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