

Product Summary

| BV _{DSS} | R _{DS(ON)} Max | I _D Max T _c = +25°C |
|-------------------|--------------------------------|--|
| 60V | 1.6mΩ @ V _{GS} = 10V | 225A |
| | 2.8mΩ @ V _{GS} = 4.5V | 180A |

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:

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

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 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)**
- **The DMTH61M8LPSQ 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

- 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
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.097 grams (Approximate)

PowerDI5060-8 (Type K)

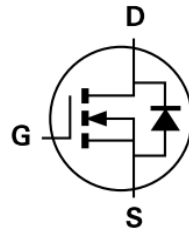


Top View

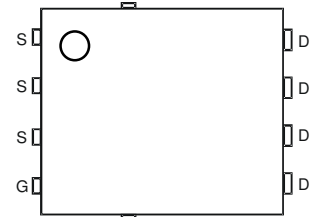


Pin1

Bottom View



Internal Schematic



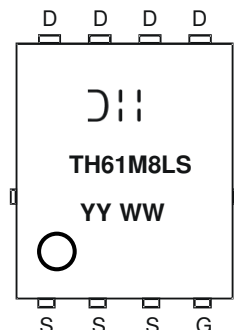
Top View
Pin Configuration

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-----------------|------------------------|--------------------|
| DMTH61M8LPSQ-13 | PowerDI5060-8 (Type K) | 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
 TH61M8LS = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 20 = 2020)
 WW = Week (01 to 53)

Maximum Ratings (@T_C = +25°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, V _{GS} = 10V (Note 6) | I _D | T _C = +25°C | 225 |
| | | T _C = +100°C | 160 |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) | I _{DM} | 900 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | I _S | 225 | A |
| Pulsed Body Diode Forward Current (10μs Pulse, Duty Cycle = 1%) | I _{SM} | 900 | A |
| Avalanche Current, L = 1mH | I _{AS} | 34.8 | A |
| Avalanche Energy, L = 1mH | E _{AS} | 605 | mJ |

Thermal Characteristics (@T_C = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5) | P _D | 3.2 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 46 | °C/W |
| Total Power Dissipation (Note 6) | P _D | 187.5 | W |
| Thermal Resistance, Junction to Case (Note 6) | R _{θJC} | 0.8 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +175 | °C |

Electrical Characteristics (@T_C = +25°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} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | μA | V _{DS} = 48V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 1 | — | 3 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 1.2 | 1.6 | mΩ | V _{GS} = 10V, I _D = 30A |
| | | — | 1.9 | 2.8 | | V _{GS} = 4.5V, I _D = 20A |
| Diode Forward Voltage | V _{SD} | — | 0.7 | 1.2 | V | V _{GS} = 0V, I _S = 20A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | — | 8320 | — | pF | V _{DS} = 30V, V _{GS} = 0V, f = 1MHz |
| Output Capacitance | C _{oss} | — | 2298 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 157 | — | | |
| Gate Resistance | R _g | — | 3 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | — | 53.3 | — | nC | V _{DS} = 30V, I _D = 30A |
| Total Gate Charge (V _{GS} = 10V) | Q _g | — | 115.5 | — | | |
| Gate-Source Charge | Q _{gs} | — | 27.8 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 16.5 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 10.3 | — | ns | V _{DD} = 30V, V _{GS} = 10V, I _D = 30A, R _g = 3Ω |
| Turn-On Rise Time | t _r | — | 23.9 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 108.3 | — | | |
| Turn-Off Fall Time | t _f | — | 51.7 | — | | |
| Body Diode Reverse Recovery Time | t _{RR} | — | 64 | — | ns | I _F = 30A, di/dt = 100A/μs |
| Body Diode Reverse Recovery Charge | Q _{RR} | — | 124 | — | nC | |

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

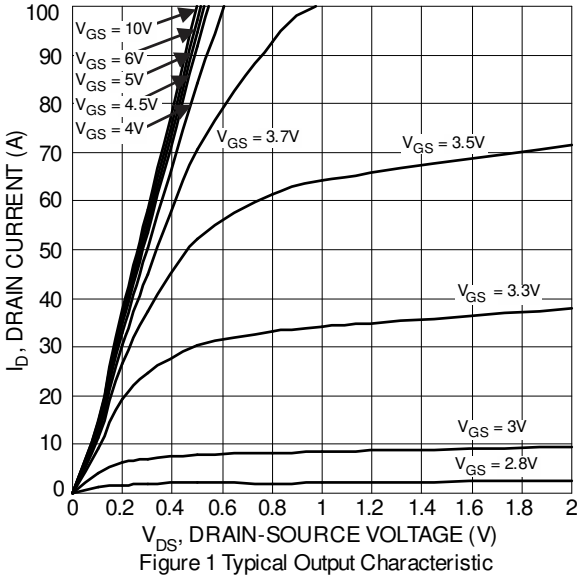


Figure 1 Typical Output Characteristic

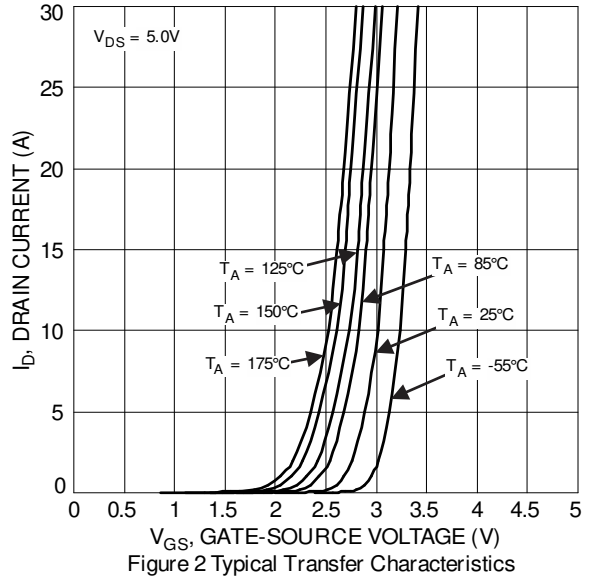


Figure 2 Typical Transfer Characteristics

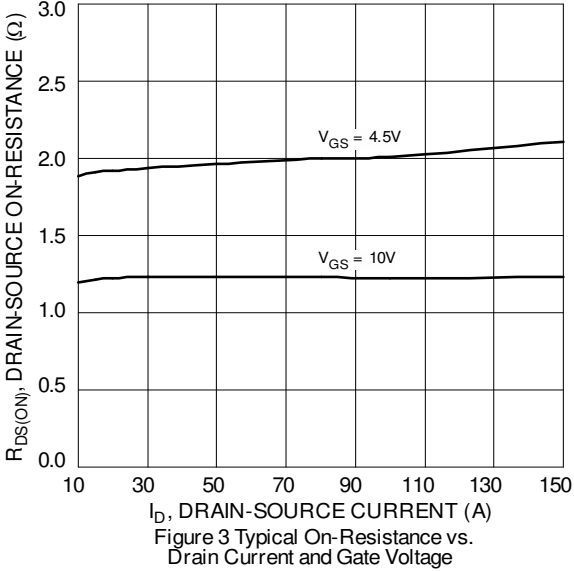


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

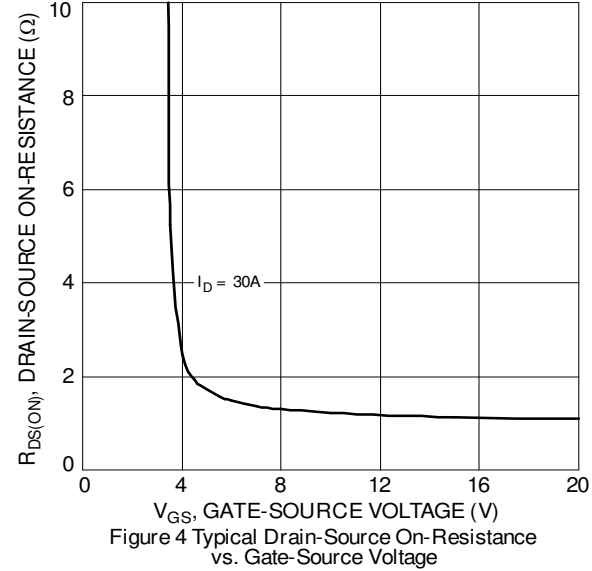


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

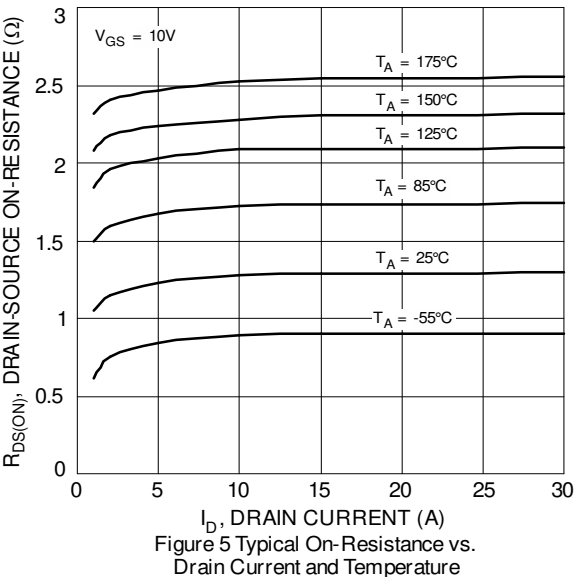


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

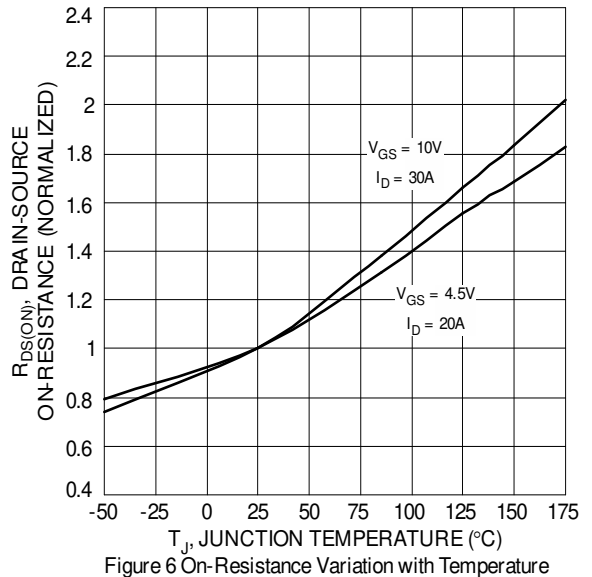


Figure 6 On-Resistance Variation with Temperature

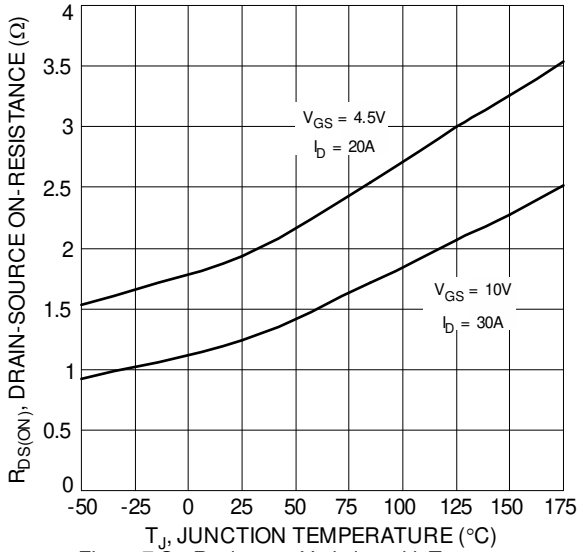


Figure 7 On-Resistance Variation with Temperature

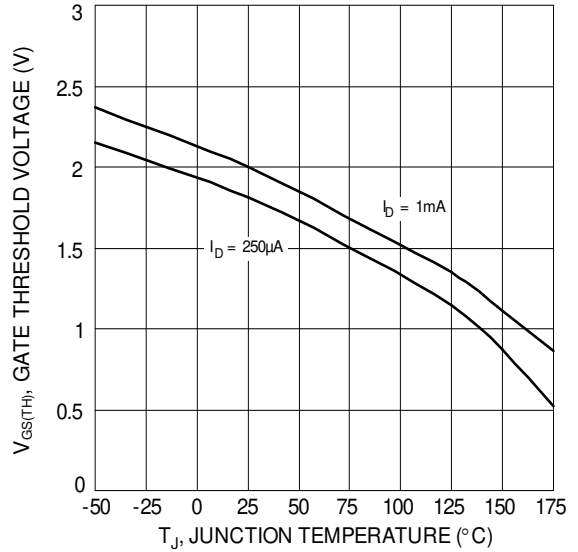


Figure 8 Gate Threshold Variation vs. Junction Temperature

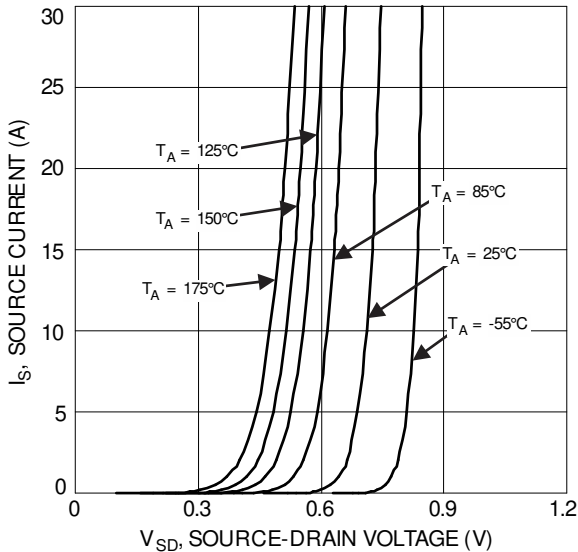


Figure 9 Diode Forward Voltage vs. Current

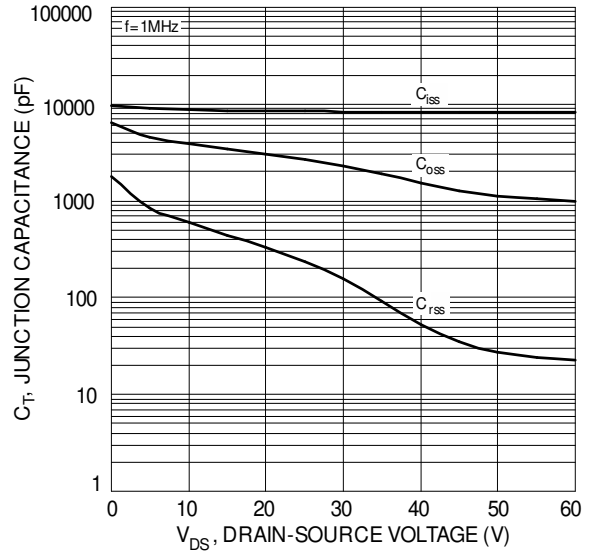


Figure 10 Typical Junction Capacitance

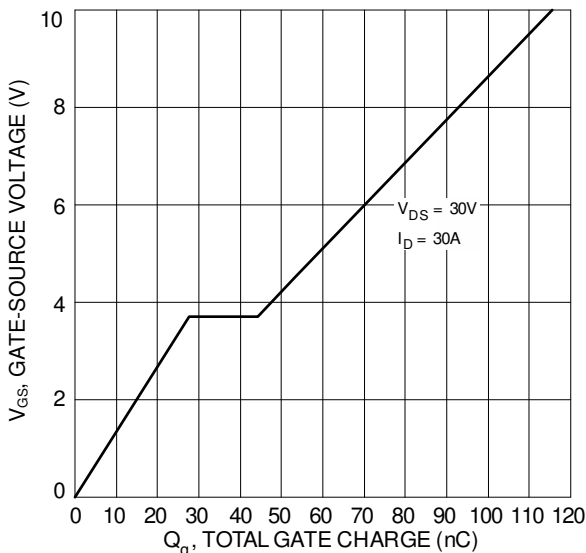


Figure 11 Gate Charge

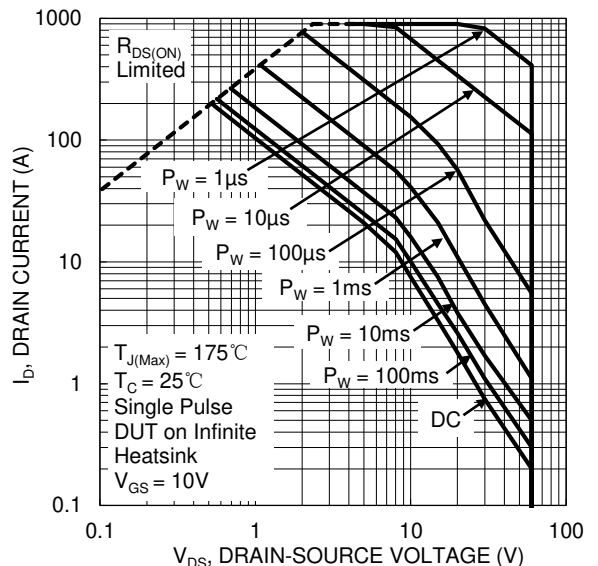
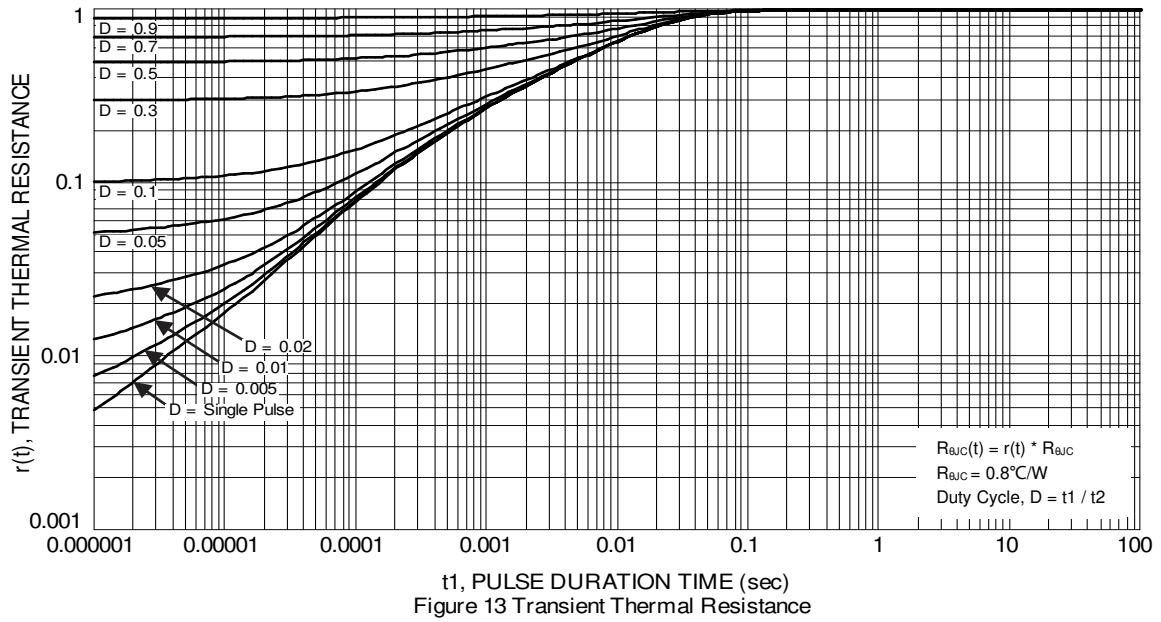


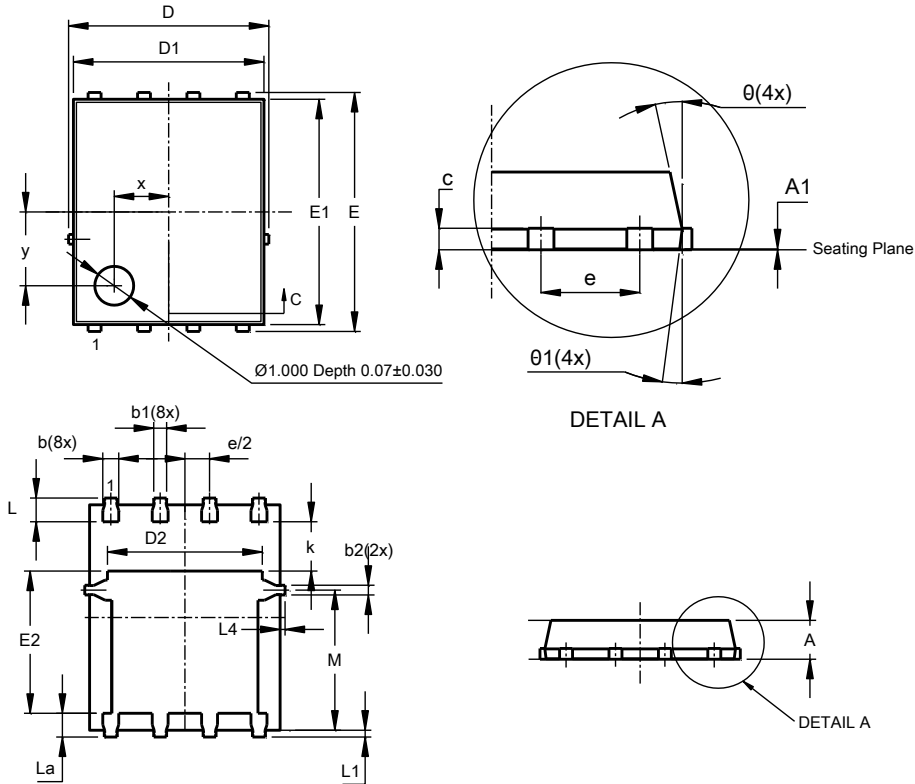
Figure 12. SOA, Safe Operation Area



Package Outline Dimensions

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

PowerDI5060-8 (Type K)

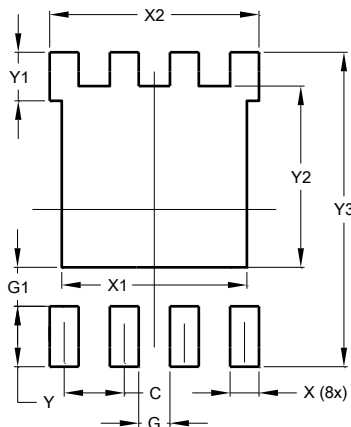


| PowerDI5060-8 (Type K) | | | |
|-----------------------------|----------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.90 | 1.10 | 1.00 |
| A1 | 0 | 0.05 | 0.02 |
| b | 0.33 | 0.51 | 0.41 |
| b1 | 0.300 | 0.366 | 0.333 |
| b2 | 0.20 | 0.35 | 0.25 |
| c | 0.23 | 0.33 | 0.277 |
| D | 5.15 BSC | | |
| 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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