

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max       | I <sub>D</sub> Max<br>T <sub>C</sub> = +25°C |
|-------------------|-------------------------------|--|
| 40V               | 3.6mΩ @ V <sub>GS</sub> = 10V | 100A   |
|                   | 5.2mΩ @ V <sub>GS</sub> = 5V  | 90A  |

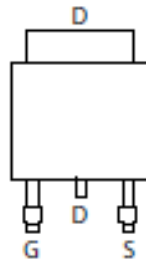
## Description and Applications

This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>), yet maintain superior switching performance, making it ideal for high efficiency power management applications.

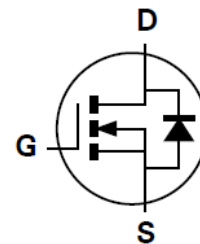
- Power Management Functions
- DC-DC Converters
- Backlighting



Top View



Pin Out Top View



Equivalent Circuit

## Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low R<sub>DS(ON)</sub> – Ensures On-State Losses are Minimized
- Excellent Q<sub>GD</sub> X R<sub>DS(ON)</sub> Product (FOM)
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([DMTH43M8LK3Q](#))**

## Mechanical Data

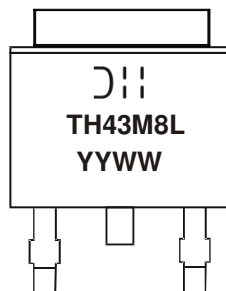
- Case: TO252 (DPAK)
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208@3
- Weight: 0.33 grams (Approximate)

## Ordering Information (Note 4)

| Part Number    | Case         | Packaging         |
|----------------|--------------|-------------------|
| DMTH43M8LK3-13 | TO252 (DPAK) | 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](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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



- ☺ = Manufacturer’s Marking
- TH43M8L = Product Type Marking Code
- YYWW = Date Code Marking
- YY = Last Two Digits of Year (ex: 17 = 2017)
- WW = Week Code (01 to 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic  | Symbol           | Value                   | Unit |
|---|------------------|-------------------------|------|
| Drain-Source Voltage  | V <sub>DSS</sub> | 40                      | V    |
| Gate-Source Voltage   | V <sub>GSS</sub> | ±20                     | V    |
| Continuous Drain Current, V <sub>GS</sub> = 10V (Note 5)        | I <sub>D</sub>   | T <sub>A</sub> = +25°C  | 17.6 |
|   |                  | T <sub>A</sub> = +100°C | 12.5 |
| Continuous Drain Current, V <sub>GS</sub> = 10V (Note 6)        | I <sub>D</sub>   | T <sub>C</sub> = +25°C  | 100  |
|   |                  | T <sub>C</sub> = +100°C | 80   |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)              | I <sub>DM</sub>  | 150                     | A    |
| Maximum Continuous Body Diode Forward Current (Note 6)          | I <sub>S</sub>   | 70                      | A    |
| Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%) | I <sub>SM</sub>  | 150                     | A    |
| Avalanche Current, L=1mH  | I <sub>AS</sub>  | 13.2                    | A    |
| Avalanche Energy, L=1mH   | E <sub>AS</sub>  | 87                      | mJ   |

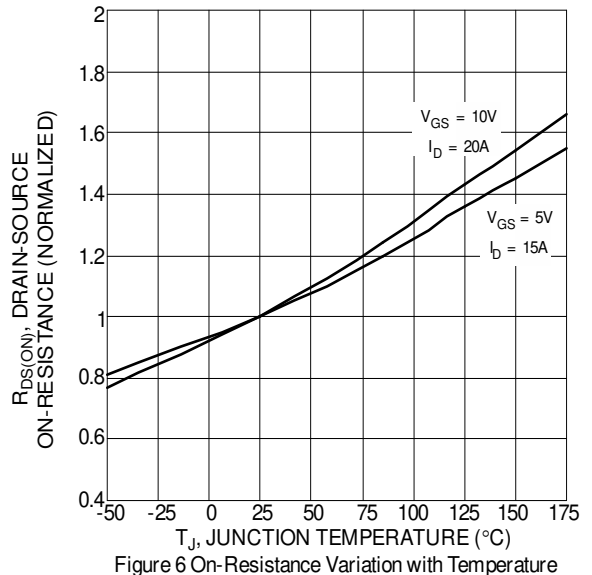
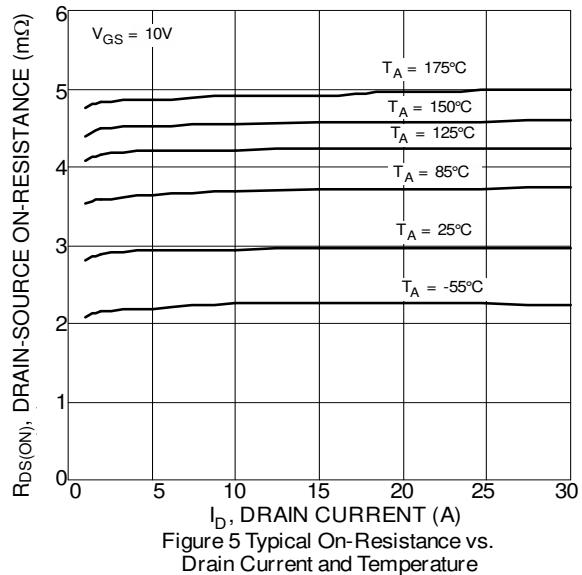
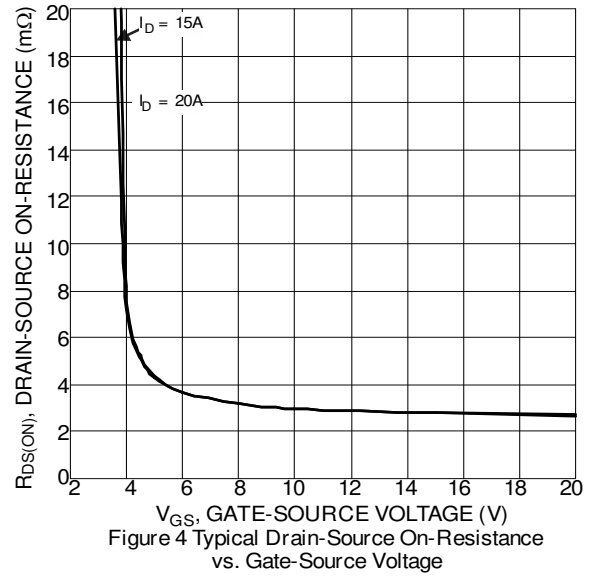
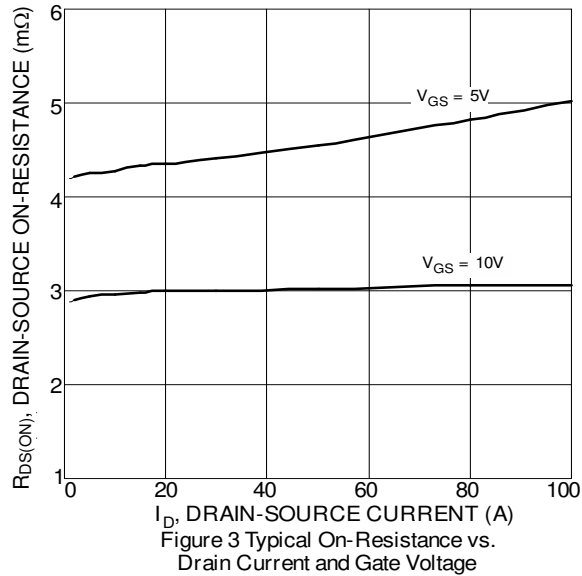
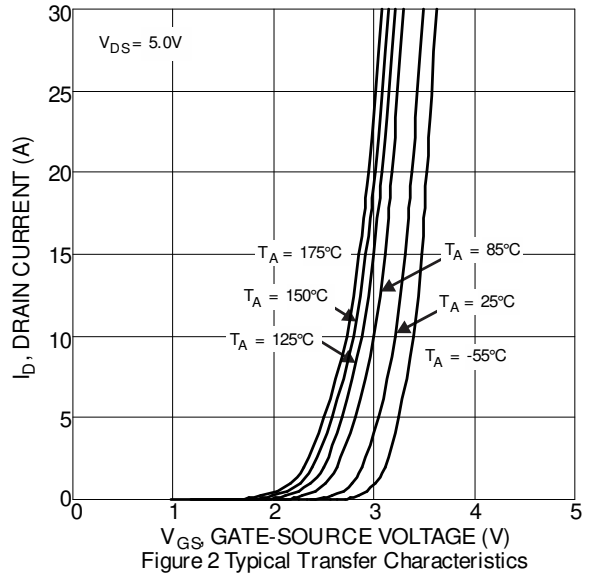
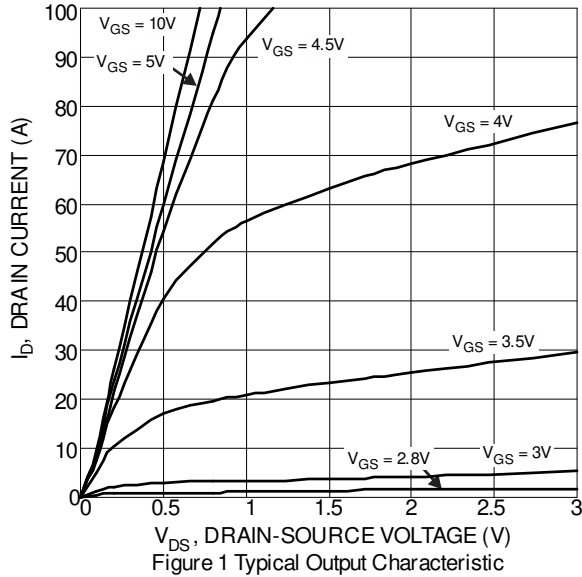
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 3.1         | W    |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 47          | °C/W |
| Total Power Dissipation (Note 6)                 | P <sub>D</sub>                    | 88          | W    |
| Thermal Resistance, Junction to Case (Note 6)    | R <sub>θJC</sub>                  | 1.7         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +175 | °C   |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                             | Symbol              | Min | Typ   | Max  | Unit | Test Condition  |
|--|---------------------|-----|-------|------|------|---|
| <b>OFF CHARACTERISTICS</b> (Note 7)        |                     |     |       |      |      |   |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 40  | —     | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA  |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —     | 1    | µA   | V <sub>DS</sub> = 32V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —     | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS</b> (Note 7)         |                     |     |       |      |      |   |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 1   | —     | 2.5  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                                |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —   | 2.9   | 3.6  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A   |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —   | 4.3   | 5.2  | mΩ   | V <sub>GS</sub> = 5V, I <sub>D</sub> = 15A  |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | —     | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A  |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 8)    |                     |     |       |      |      |   |
| Input Capacitance                          | C <sub>ISS</sub>    | —   | 2,693 | —    | pF   | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V, f = 1MHz                                     |
| Output Capacitance                         | C <sub>OSS</sub>    | —   | 1,172 | —    |      |   |
| Reverse Transfer Capacitance               | C <sub>RSS</sub>    | —   | 52    | —    |      |   |
| Gate Resistance                            | R <sub>G</sub>      | —   | 2.54  | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                      |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>G</sub>      | —   | 38.5  | —    | nC   | V <sub>DS</sub> = 20V, I <sub>D</sub> = 20A   |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>G</sub>      | —   | 17.6  | —    |      |   |
| Gate-Source Charge                         | Q <sub>GS</sub>     | —   | 6.9   | —    |      |   |
| Gate-Drain Charge                          | Q <sub>GD</sub>     | —   | 6.9   | —    |      |   |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  | —   | 5.2   | —    | ns   | V <sub>DD</sub> = 20V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A, R <sub>G</sub> = 1.6Ω |
| Turn-On Rise Time                          | t <sub>R</sub>      | —   | 5.7   | —    |      |   |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> | —   | 23.5  | —    |      |   |
| Turn-Off Fall Time                         | t <sub>F</sub>      | —   | 11    | —    |      |   |
| Body Diode Reverse Recovery Time           | t <sub>RR</sub>     | —   | 35.4  | —    | ns   | I <sub>F</sub> = 15A, di/dt = 100A/µs   |
| Body Diode Reverse Recovery Charge         | Q <sub>RR</sub>     | —   | 32.9  | —    | nC   |   |

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch 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.



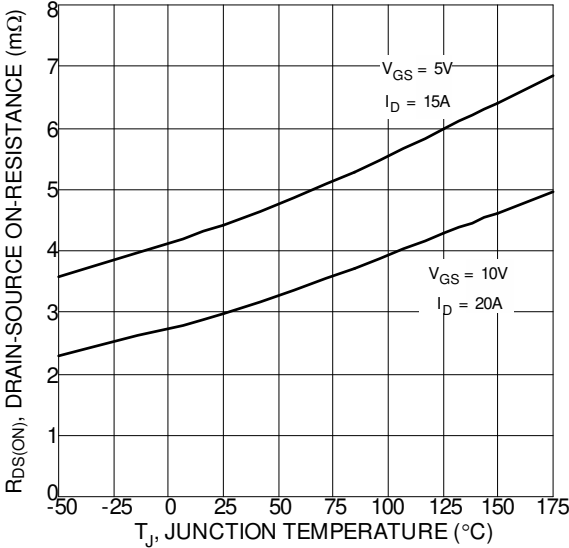


Figure 7 On-Resistance Variation with Temperature

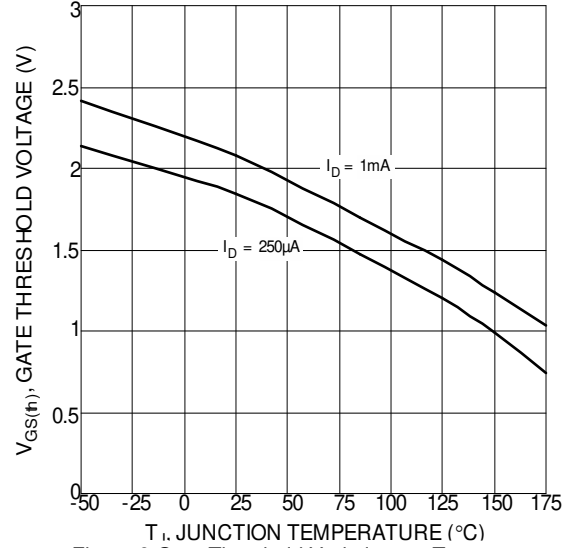


Figure 8 Gate Threshold Variation vs. Temperature

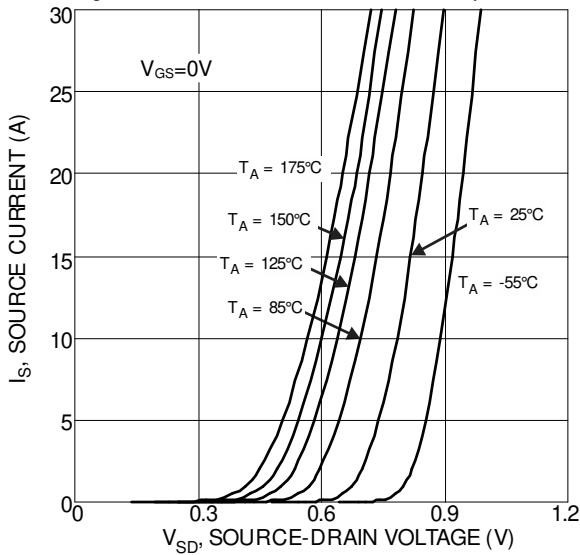


Figure 9 Diode Forward Voltage vs. Current

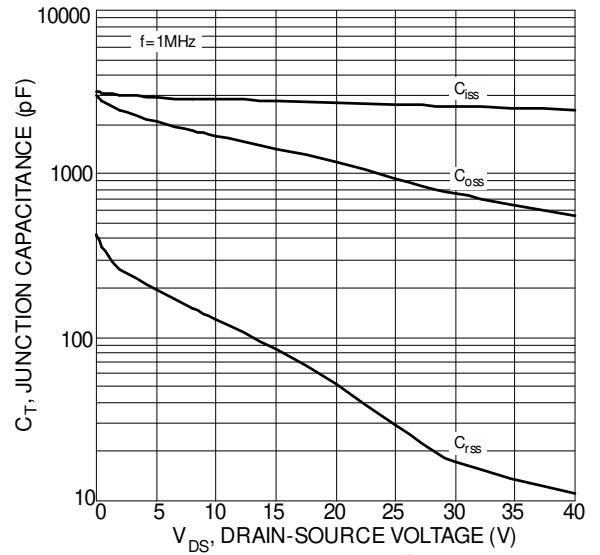


Figure 10 Typical Junction Capacitance

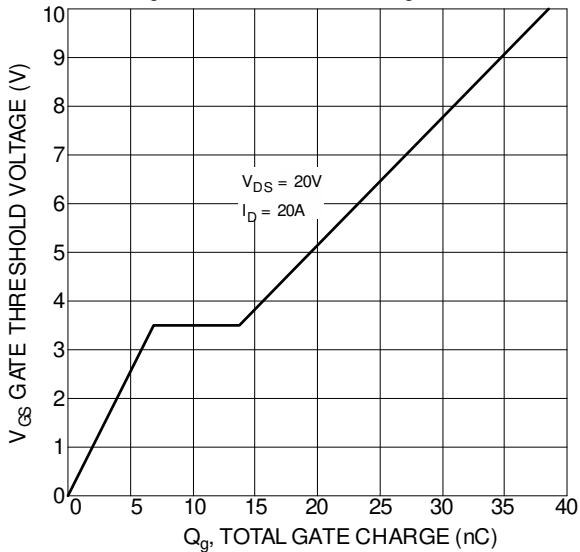


Figure 11 Gate Charge

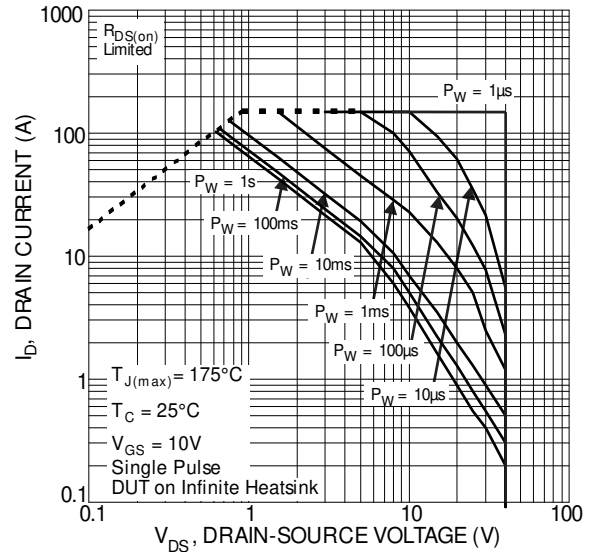
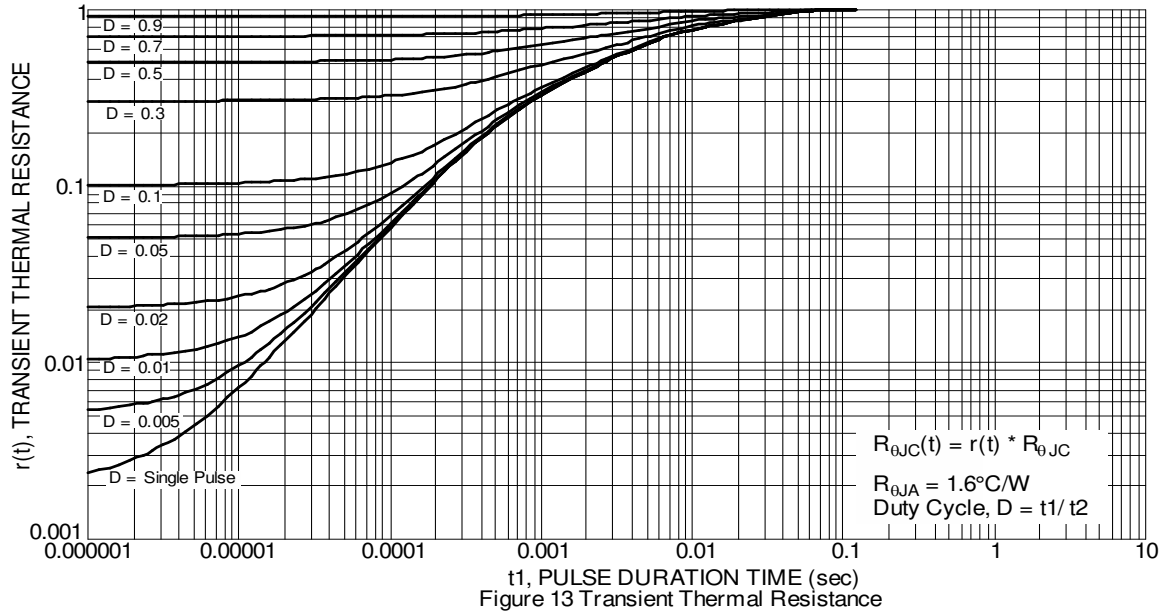


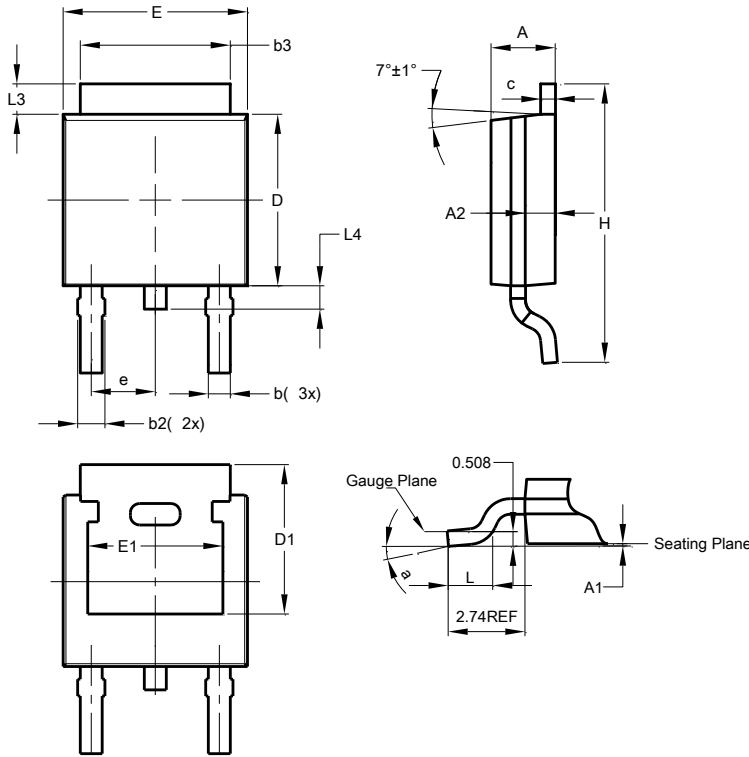
Figure 12 SOA, Safe Operation Area



**Package Outline Dimensions**

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

**TO252 (DPAK)**

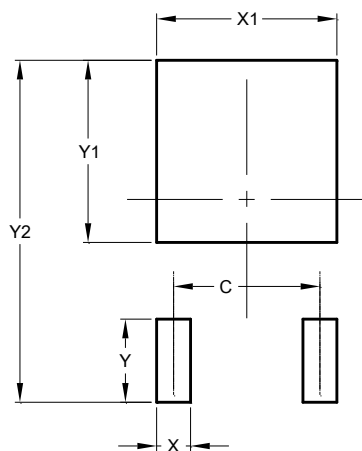


| TO252 (DPAK)         |      |       |       |
|----------------------|------|-------|-------|
| Dim                  | Min  | Max   | Typ   |
| A                    | 2.19 | 2.39  | 2.29  |
| A1                   | 0.00 | 0.13  | 0.08  |
| A2                   | 0.97 | 1.17  | 1.07  |
| b                    | 0.64 | 0.88  | 0.783 |
| b2                   | 0.76 | 1.14  | 0.95  |
| b3                   | 5.21 | 5.46  | 5.33  |
| c                    | 0.45 | 0.58  | 0.531 |
| D                    | 6.00 | 6.20  | 6.10  |
| D1                   | 5.21 | -     | -     |
| e                    | -    | -     | 2.286 |
| E                    | 6.45 | 6.70  | 6.58  |
| E1                   | 4.32 | -     | -     |
| H                    | 9.40 | 10.41 | 9.91  |
| L                    | 1.40 | 1.78  | 1.59  |
| L3                   | 0.88 | 1.27  | 1.08  |
| L4                   | 0.64 | 1.02  | 0.83  |
| a                    | 0°   | 10°   | -     |
| All Dimensions in mm |      |       |       |

**Suggested Pad Layout**

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

**TO252 (DPAK)**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 4.572         |
| X          | 1.060         |
| X1         | 5.632         |
| Y          | 2.600         |
| Y1         | 5.700         |
| Y2         | 10.700        |

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