

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max         | I <sub>D</sub> Max<br>T <sub>C</sub> = +25°C |
|-------------------|---------------------------------|----------------------------------------------|
| 60V               | 10mΩ @ V <sub>GS</sub> = 10V    | 59A                                          |
|                   | 12.8mΩ @ V <sub>GS</sub> = 4.5V | 52A                                          |

## Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 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)
- Advanced Technology for DC/DC Converters
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. “Green” Device (Note 3)**
- The DMTH6009LK3Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

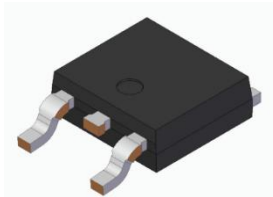
<https://www.diodes.com/quality/product-definitions/>

## Description and Applications

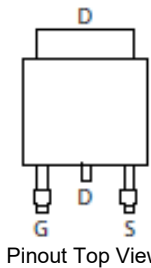
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Power-management functions
- DC-DC converters
- Backlighting

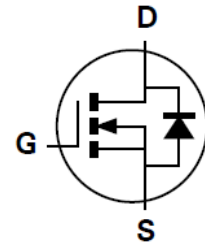
TO252 (DPAK)



Top View



Pinout Top View



Equivalent Circuit

## Mechanical Data

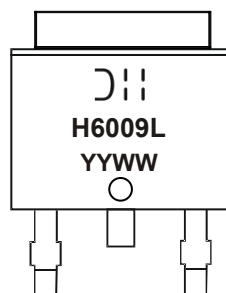
- Package: TO252
- Package Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.33 grams (Approximate)

## Ordering Information (Note 4)

| Orderable Part Number | Package      | Packing |             |
|-----------------------|--------------|---------|-------------|
|                       |              | Qty.    | Carrier     |
| DMTH6009LK3Q-13       | TO252 (DPAK) | 2,500   | Tape & Reel |

- Notes:
- EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  - 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.
  - Halogen- and Antimony-free “Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



DII = Manufacturer's Marking  
 H6009L = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 26 = 2026)  
 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> | 60                             | V    |
| Gate-Source Voltage                                     | V <sub>GSS</sub> | ±16                            | V    |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V | I <sub>D</sub>   | T <sub>A</sub> = +25°C<br>14.2 | A    |
|                                                         |                  | T <sub>A</sub> = +70°C<br>11.9 |      |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V | I <sub>D</sub>   | T <sub>C</sub> = +25°C<br>59   | A    |
|                                                         |                  | T <sub>C</sub> = +70°C<br>49   |      |
| Maximum Continuous Body Diode Forward Current (Note 6)  | I <sub>S</sub>   | 80                             | A    |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)      | I <sub>DM</sub>  | 90                             | A    |
| Avalanche Current, L = 0.1mH                            | I <sub>AS</sub>  | 20.3                           | A    |
| Avalanche Energy, L = 0.1mH                             | E <sub>AS</sub>  | 20.6                           | mJ   |

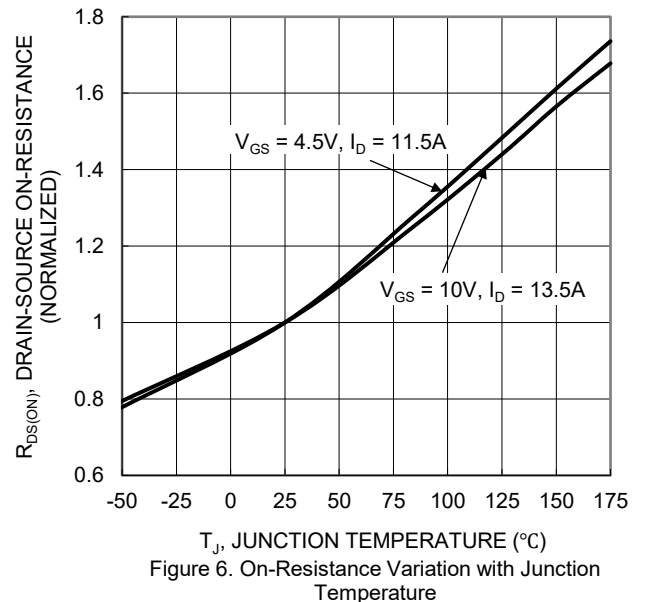
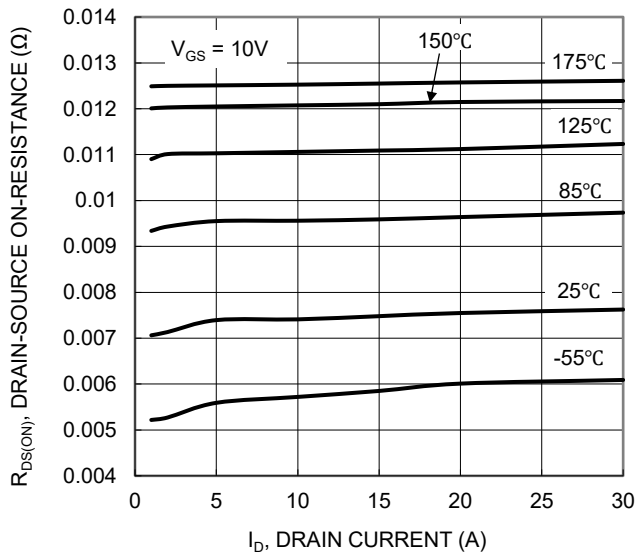
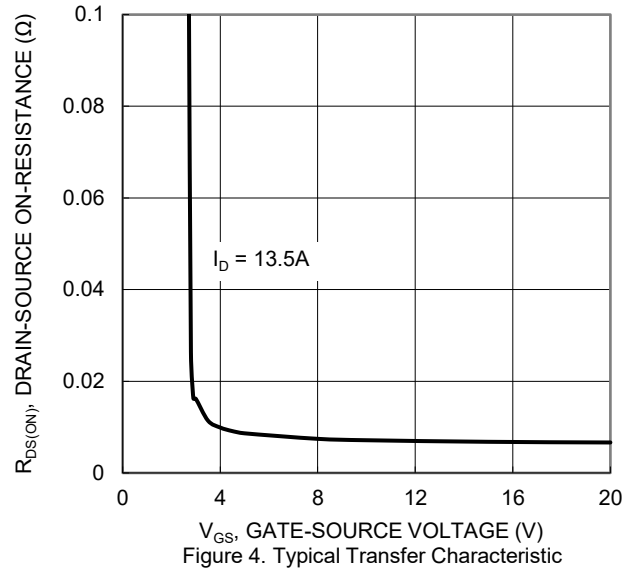
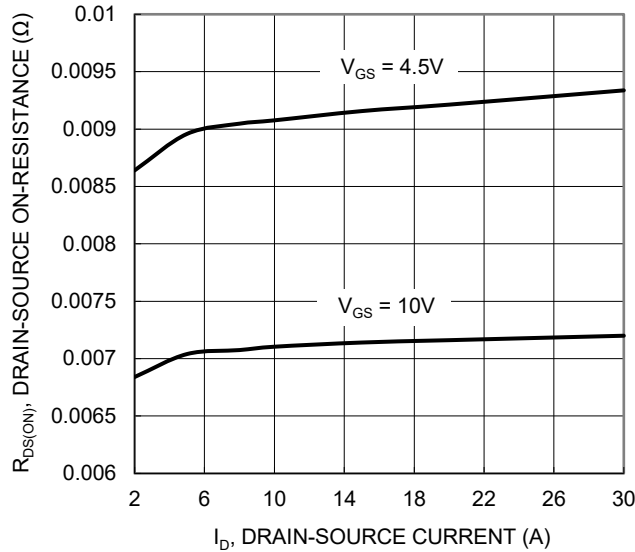
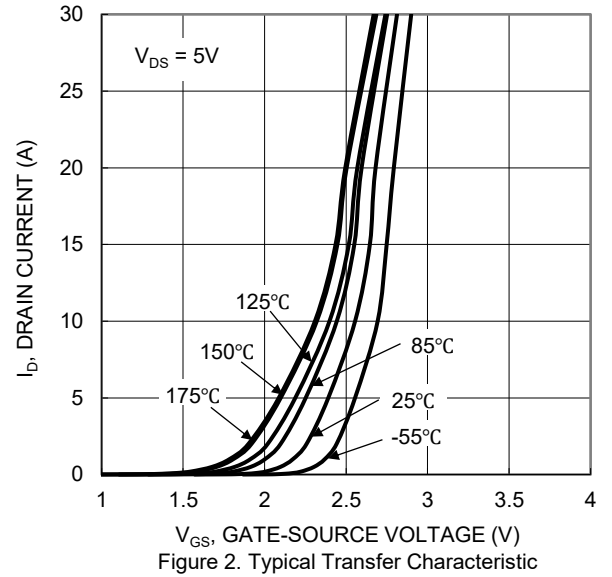
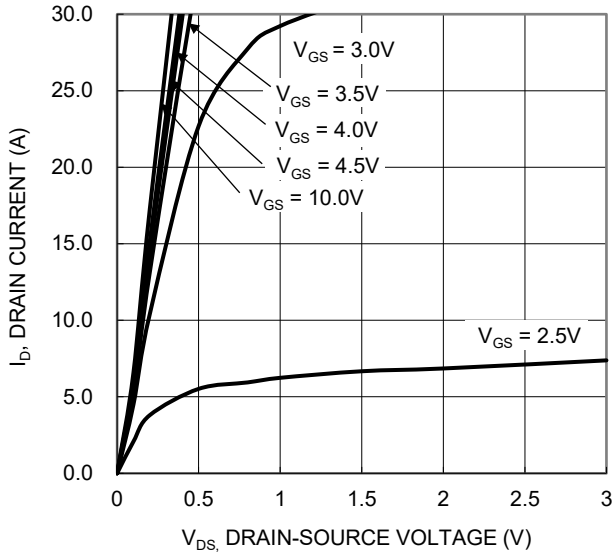
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

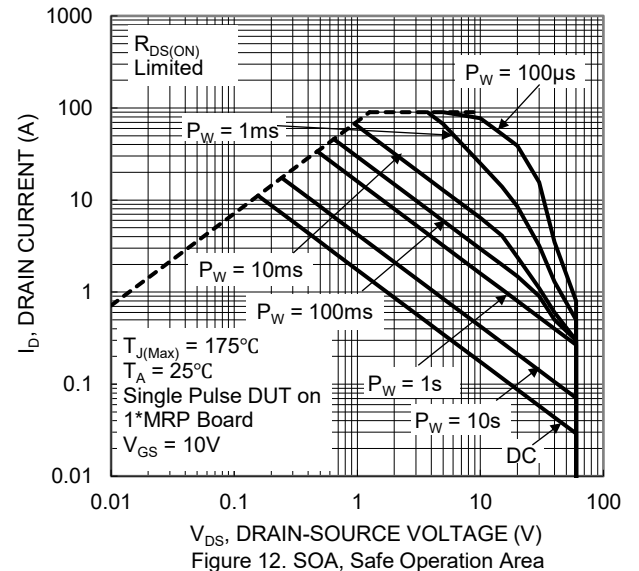
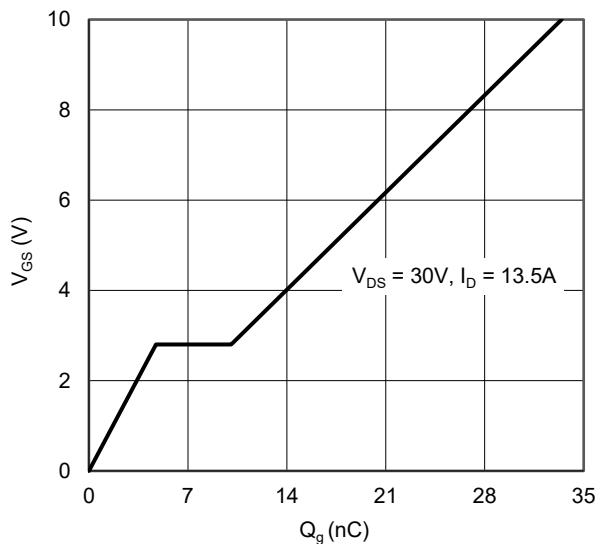
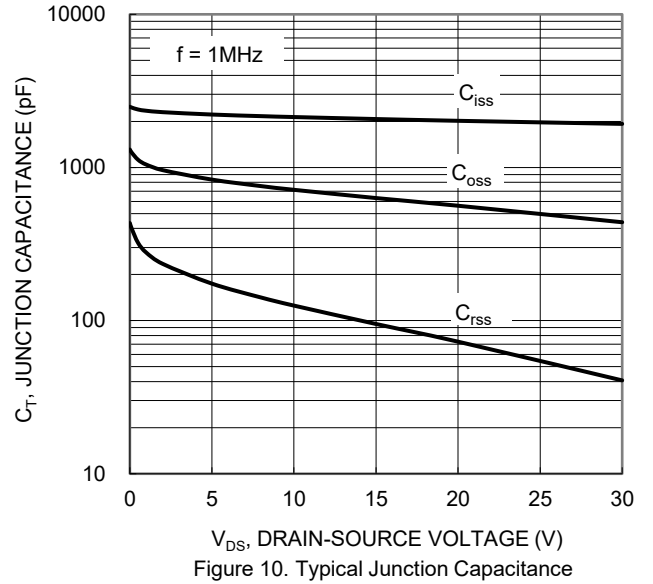
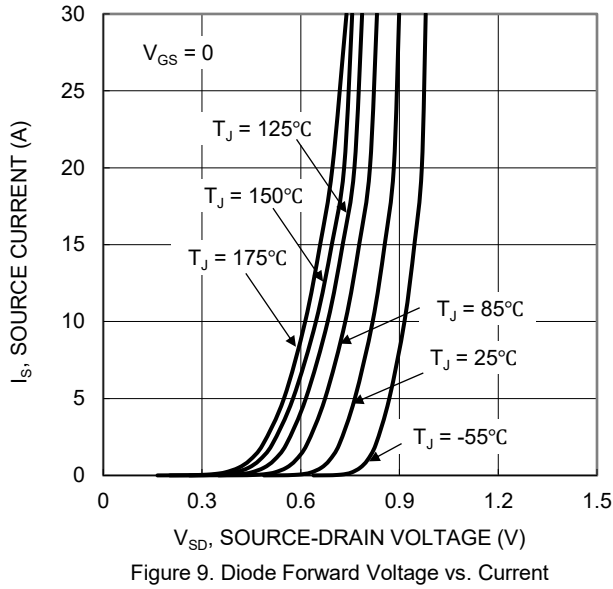
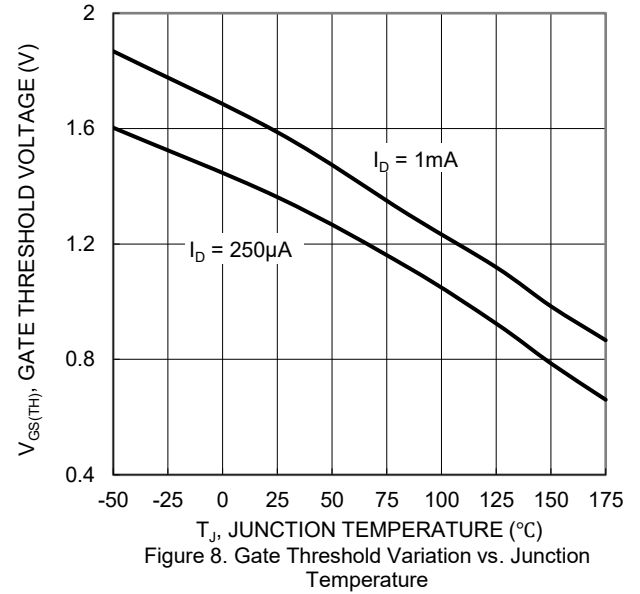
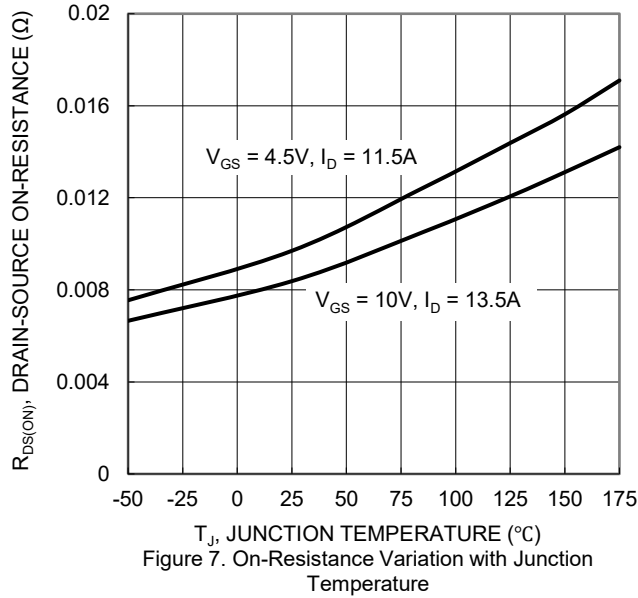
| Characteristic                                   | Symbol                            | Value       | Unit |
|--------------------------------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 3.2         | W    |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 47          | °C/W |
| Total Power Dissipation (Note 6)                 | P <sub>D</sub>                    | 60          | W    |
| Thermal Resistance, Junction to Case (Note 6)    | R <sub>θJC</sub>                  | 2.5         | °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 (Note 7)</b>        |                     |     |       |      |      |                                                                                              |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 60  | —     | —    | V    | V <sub>GS</sub> = 0, I <sub>D</sub> = 1mA                                                    |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —     | 1    | µA   | V <sub>DS</sub> = 48V, V <sub>GS</sub> = 0                                                   |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —     | ±100 | nA   | V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0                                                  |
| <b>ON CHARACTERISTICS (Note 7)</b>         |                     |     |       |      |      |                                                                                              |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 0.7 | 1.4   | 2    | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                                   |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —   | 8.3   | 10   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 13.5A                                                |
|                                            |                     | —   | 9.6   | 12.8 | mΩ   | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 11.5A                                               |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.9   | 1.2  | V    | V <sub>GS</sub> = 0, I <sub>S</sub> = 20A                                                    |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>    |                     |     |       |      |      |                                                                                              |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 1,925 | —    | pF   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0,<br>f = 1MHz                                      |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 438   | —    |      |                                                                                              |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 41    | —    |      |                                                                                              |
| Gate Resistance                            | R <sub>g</sub>      | —   | 1.7   | —    | Ω    | V <sub>DS</sub> = 0, V <sub>GS</sub> = 0, f = 1MHz                                           |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 15.6  | —    | nC   | V <sub>DS</sub> = 30V, I <sub>D</sub> = 13.5A                                                |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 33.5  | —    |      |                                                                                              |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 4.7   | —    |      |                                                                                              |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 5.3   | —    |      |                                                                                              |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  | —   | 4.5   | —    | ns   | V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V,<br>R <sub>g</sub> = 6Ω, I <sub>D</sub> = 13.5A |
| Turn-On Rise Time                          | t <sub>r</sub>      | —   | 8.6   | —    |      |                                                                                              |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> | —   | 35.9  | —    |      |                                                                                              |
| Turn-Off Fall Time                         | t <sub>f</sub>      | —   | 15.7  | —    |      |                                                                                              |
| Body Diode Reverse-Recovery Time           | t <sub>RR</sub>     | —   | 18.2  | —    | ns   | I <sub>F</sub> = 13.5A, di/dt = 400A/µs                                                      |
| Body Diode Reverse-Recovery Charge         | Q <sub>RR</sub>     | —   | 33.1  | —    | nC   |                                                                                              |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout.
  - Device mounted on infinite heatsink and measured by thermal couple attached on bottom heatsink of package.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.





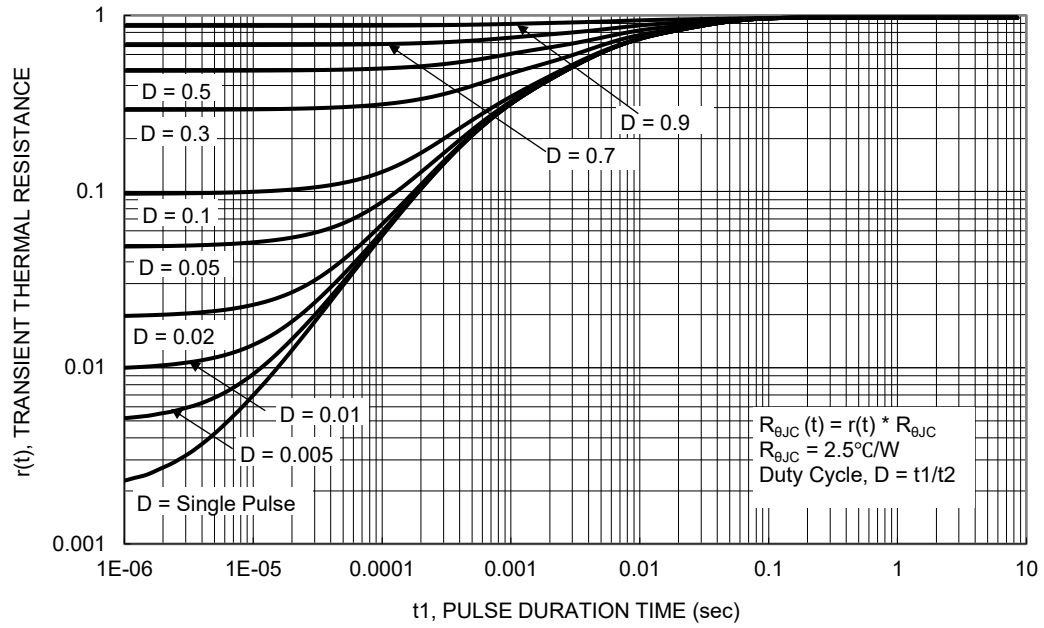
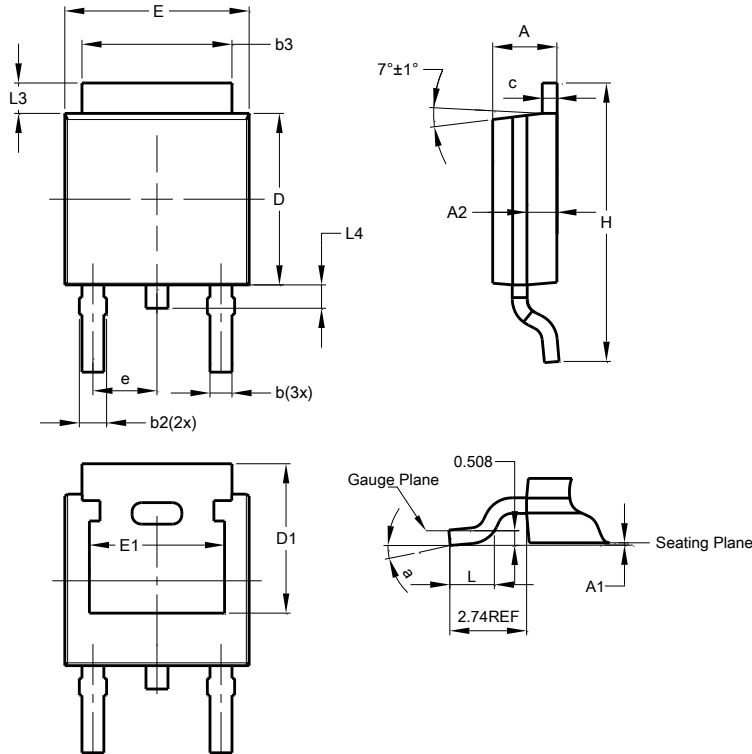


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

### TO252 (DPAK)

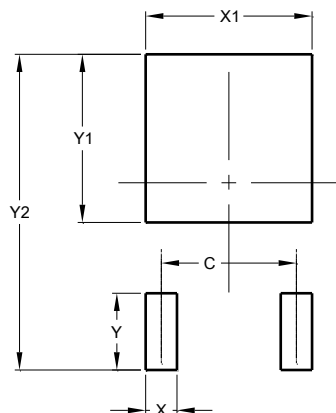


| TO252 (DPAK)         |           |       |       |
|----------------------|-----------|-------|-------|
| Dim                  | Min       | Max   | Typ   |
| A                    | 2.19      | 2.39  | 2.29  |
| A1                   | 0.00      | 0.13  | 0.08  |
| A2                   | 0.97      | 1.17  | 1.07  |
| b                    | 0.64      | 0.88  | 0.783 |
| b2                   | 0.76      | 1.14  | 0.95  |
| b3                   | 5.21      | 5.50  | 5.33  |
| c                    | 0.45      | 0.58  | 0.531 |
| D                    | 6.00      | 6.20  | 6.10  |
| D1                   | 5.21      | --    | --    |
| e                    | 2.286 BSC |       |       |
| 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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