# 100V N-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max | $I_D$ $T_C$ = +25°C |
|---|---|---|
| 100V | 9mΩ @ $V_{GS}$ = 10V | 84A |
| | 14mΩ @ $V_{GS}$ = 6V | 66A |

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

## Description and Applications

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.

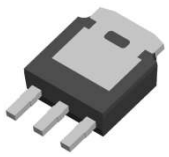
- Motor Control
- Backlighting

## Mechanical Data

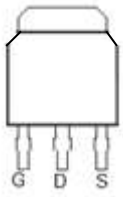
- Case: TO251
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.33 grams (Approximate)

**TO251 (Type TH3)**

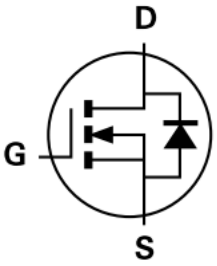
Top View



Bottom View




Top View
Pin Configuration




Internal Schematic

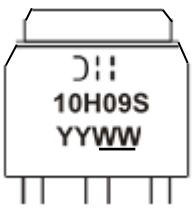
## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMT10H9M9SH3 | TO251 (Type TH3) | 75 Pieces / Tube |

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

**TO251 (Type TH3)**




= Manufacturer's Marking
10H09S = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 21 = 2021)
WW = Week Code (01 to 53)

## 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 (Note 5) $V_{GS}$ = 10V | $T_C$ = +25°C<br>$T_C$ = +70°C | $I_D$ | 84<br>67 | A |
| Maximum Body Diode Forward Current (Note 6) | | $I_S$ | 84 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | $I_{DM}$ | 336 | A |
| Pulsed Body Diode Forward Current (10µs Pulse, $T_C$ = +25°C, Package Limited) | | $I_{SM}$ | 336 | A |
| Avalanche Current, L = 3mH (Note 9) | | $I_{AS}$ | 11 | A |
| Avalanche Energy, L = 3mH (Note 9) | | $E_{AS}$ | 181.5 | mJ |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | $T_C$ = +25°C | $P_D$ | 114 | W |
| | $T_C$ = +70°C | | 73 | |
| Thermal Resistance, Junction to Ambient (Note 6) | | $R_{\theta JA}$ | 41 | °C/W |
| Thermal Resistance, Junction to Case (Note 5) | | $R_{\theta JC}$ | 1.1 | |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 8)** | | | | | | |
| 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 8)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 2 | — | 4 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 7.4 | 9 | mΩ | $V_{GS}$ = 10V, $I_D$ = 20A |
| | | — | 10.9 | 14 | mΩ | $V_{GS}$ = 6V, $I_D$ = 5A |
| Diode Forward Voltage | $V_{SD}$ | — | 0.8 | 1.2 | V | $V_{GS}$ = 0V, $I_S$ = 13A |
| **DYNAMIC CHARACTERISTICS (Note 7)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 2085 | — | pF | $V_{DS}$ = 50V, $V_{GS}$ = 0V<br>f = 1MHz |
| Output Capacitance | $C_{oss}$ | — | 609 | — | | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 13 | — | | |
| Gate Resistance | $R_G$ | — | 1.7 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge | $Q_g$ | — | 30 | — | nC | $V_{DD}$ = 50V, $I_D$ = 13A,<br>$V_{GS}$ = 10V |
| Gate-Source Charge | $Q_{gs}$ | — | 9.5 | — | | |
| Gate-Drain Charge | $Q_{gd}$ | — | 7.3 | — | | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 9.7 | — | ns | $V_{DD}$ = 50V, $V_{GS}$ = 10V,<br>$I_D$ = 13A, $R_G$ = 6Ω |
| Turn-On Rise Time | $t_R$ | — | 13.7 | — | | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 25.1 | — | | |
| Turn-Off Fall Time | $t_F$ | — | 17.3 | — | | |
| Reverse Recovery Time | $t_{RR}$ | — | 45 | — | ns | $I_F$ = 13A, di/dt = 100A/µs |
| Reverse Recovery Charge | $Q_{RR}$ | — | 68 | — | nC | |

Notes:
5. Device mounted on infinite heatsink.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
7. Guaranteed by design. Not subject to production testing.
8. Short duration pulse test used to minimize self-heating effect.
9. It depends on limited duration repetitive pulse and duty cycle, and limited by junction temperature $T_{J(MAX)}$ = +125°C.

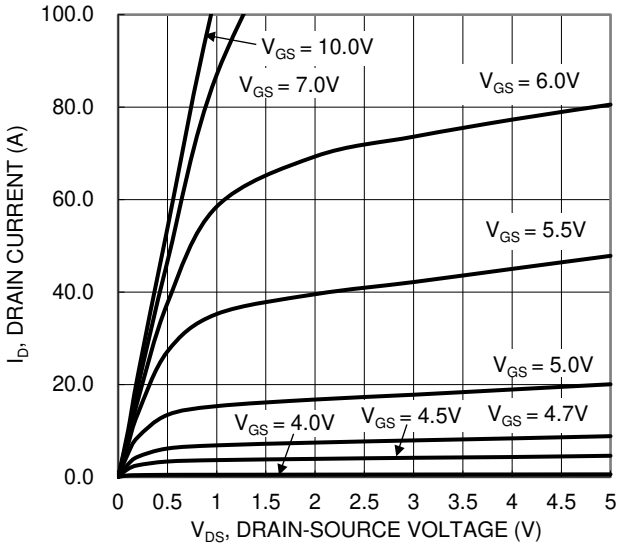


Figure 1. Typical Output Characteristic

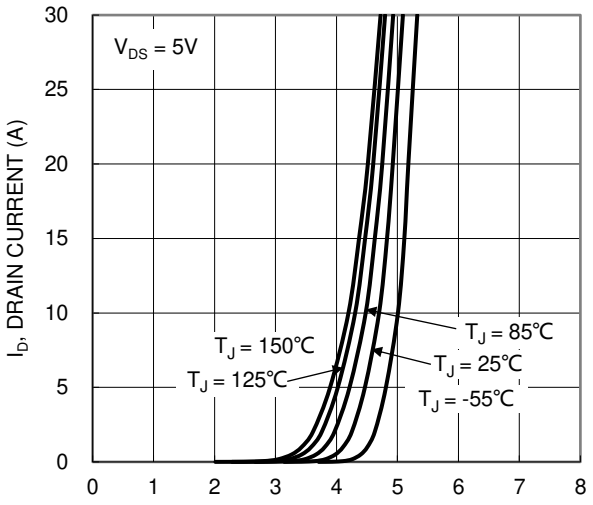


Figure 2. Typical Transfer Characteristic

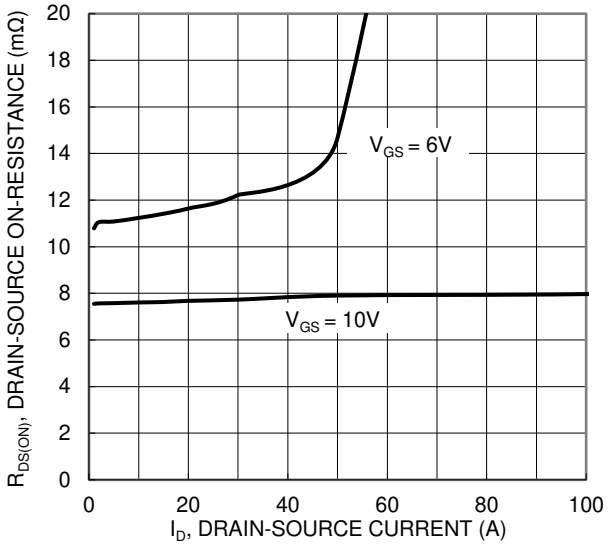


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

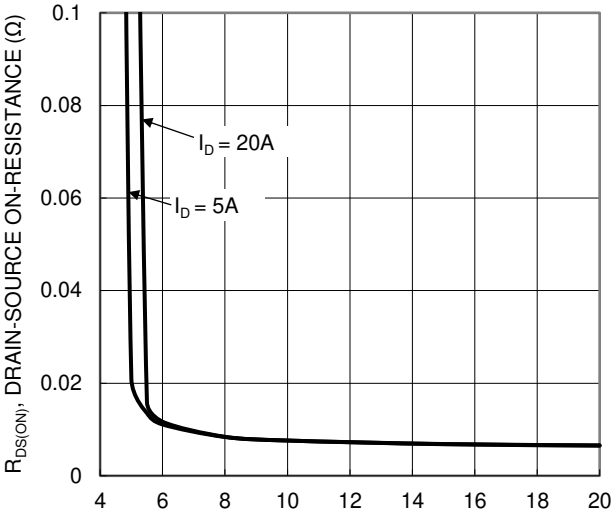


Figure 4. Typical Transfer Characteristic

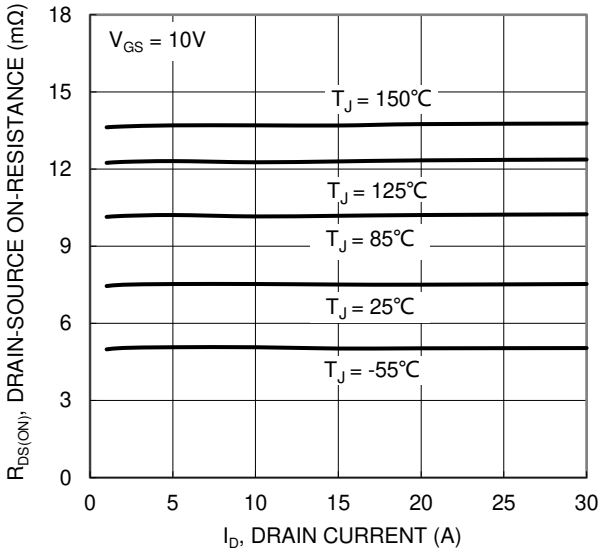


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

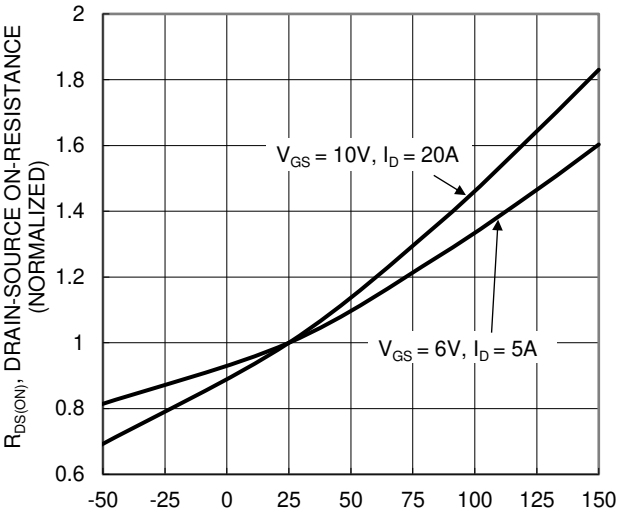


Figure 6. On-Resistance Variation with Junction Temperature

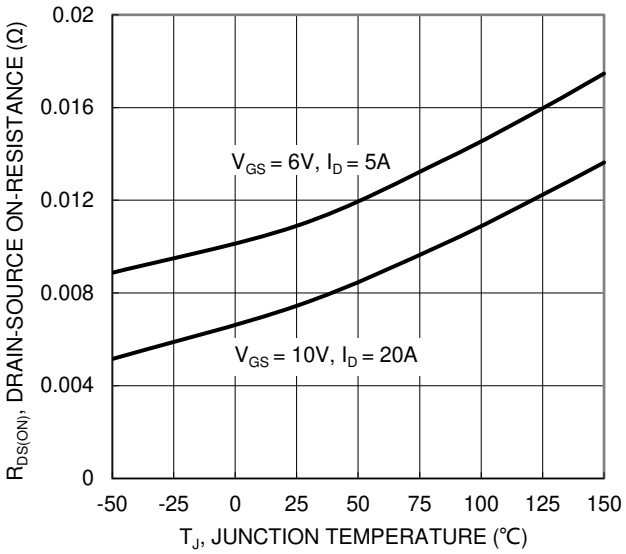



Figure 7. On-Resistance Variation with Junction Temperature

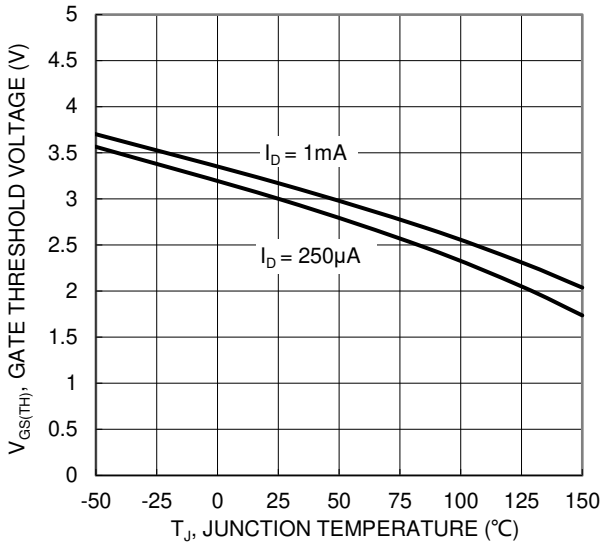



Figure 8. Gate Threshold Variation vs. Junction Temperature

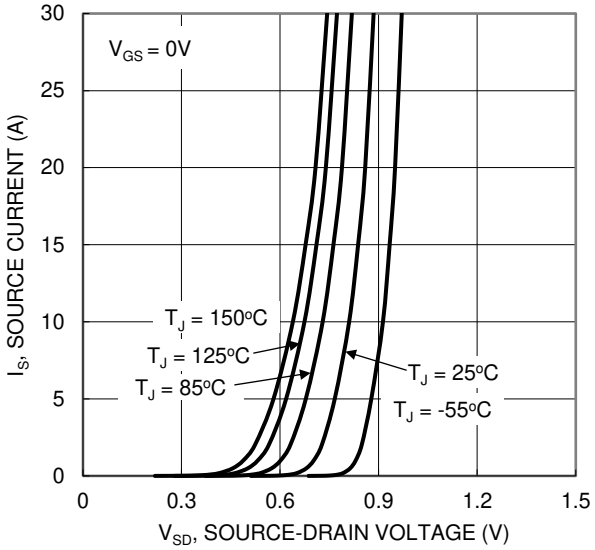



Figure 9. Diode Forward Voltage vs. Current

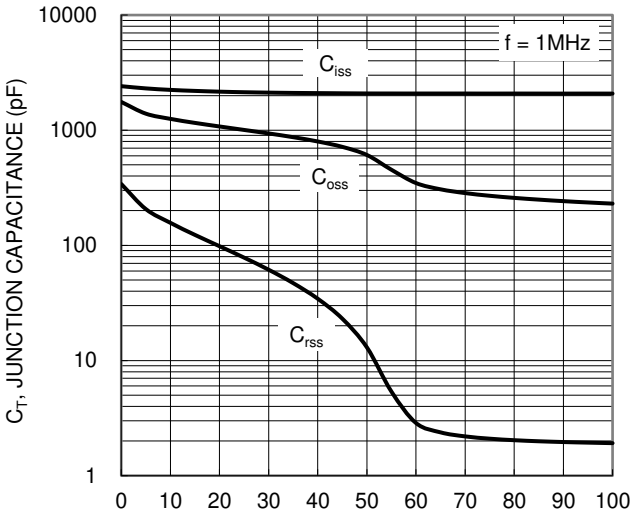



Figure 10. Typical Junction Capacitance

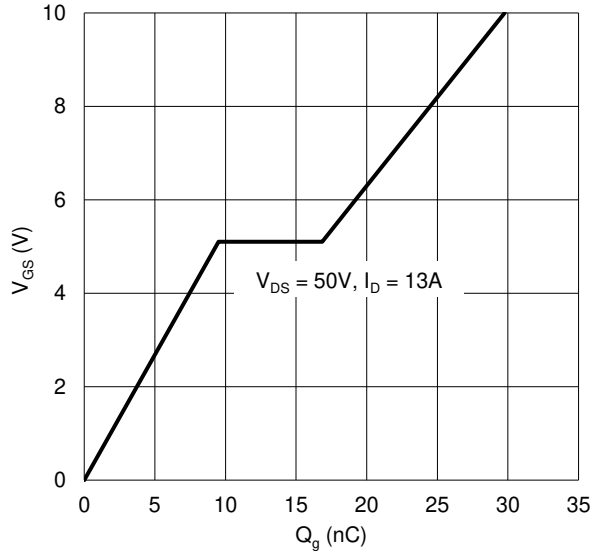



Figure 11. Gate Charge

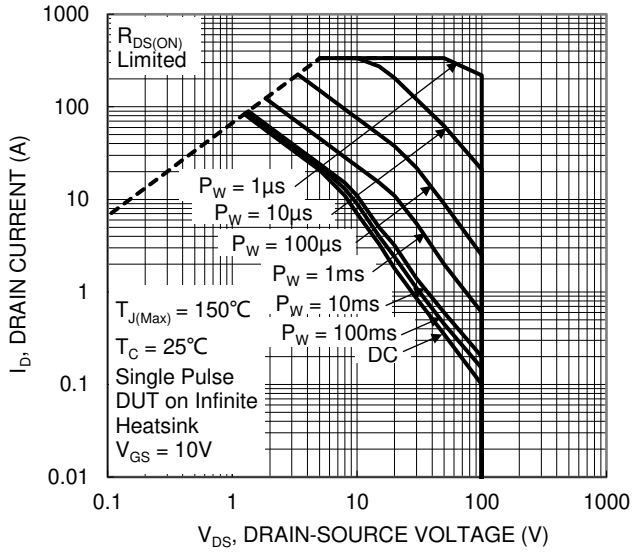



Figure 12. SOA, Safe Operation Area

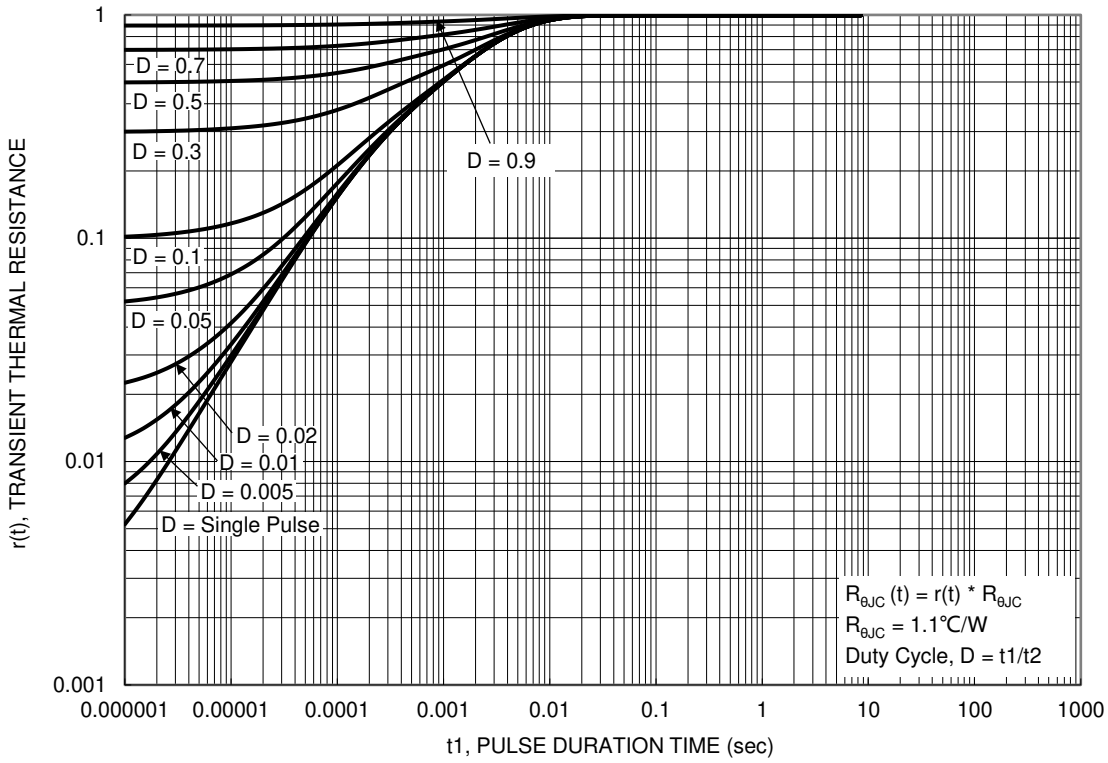
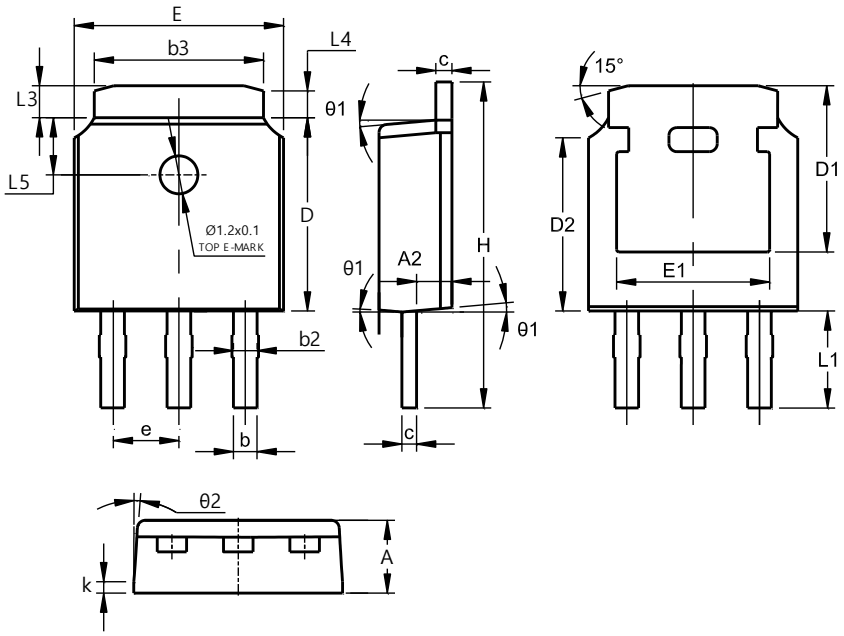



Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

**TO251 (Type TH3)**




| TO251 (Type TH3) | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 2.20 | 2.40 | 2.30 |
| **A2** | 0.97 | 1.17 | 1.07 |
| **b** | 0.68 | 0.90 | 0.78 |
| **b2** | 0.76 | 0.95 | 0.84 |
| **b3** | 5.20 | 5.50 | 5.33 |
| **c** | 0.43 | 0.63 | 0.53 |
| **D** | 5.98 | 6.22 | 6.10 |
| **D1** | 5.30 REF | | |
| **D2** | 5.26 | 5.66 | 5.46 |
| **e** | 2.286 BSC | | |
| **E** | 6.40 | 6.80 | 6.60 |
| **E1** | 4.63 | 5.03 | 4.83 |
| **H** | 9.40 | 9.85 | 9.62 |
| **k** | 0.40REF | | |
| **L1** | 2.30 | 2.70 | 2.50 |
| **L3** | 0.88 | 1.28 | 1.02 |
| **L4** | 0.75 REF | | |
| **L5** | 1.65 | 1.95 | 1.80 |
| **θ1** | 5° | 9° | 7° |
| **θ2** | 5° | 9° | 7° |
| **All Dimensions in mm** | | | |

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