

Product Summary

| BV _{DSS} | R _{DS(ON)} Max | I _D T _C = +25°C |
|-------------------|------------------------------|--|
| 100V | 14mΩ @ V _{GS} = 10V | 59A |
| | 20mΩ @ V _{GS} = 6V | 50A |

Description

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

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low R_{DS(ON)} – Minimizes Power Losses
- Low Q_g – Minimizes Switching Losses
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **The DMTH10H015SK3Q 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/>

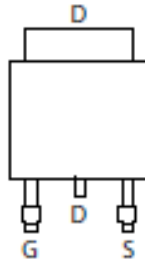
Mechanical Data

- Case: TO252
- 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
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.33 grams (Approximate)

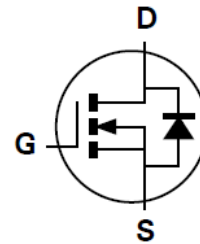
TO252 (DPAK)



Top View



Pin Out Top View



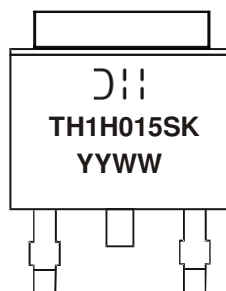
Equivalent Circuit

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-------------------|--------------|------------------|
| DMTH10H015SK3Q-13 | TO252 (DPAK) | 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



D|| = Manufacturer's Marking
 TH1H015SK = 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, V _{GS} = 10V | I _D | T _C = +25°C | 59 |
| | | T _C = +100°C | 42 |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | I _{DM} | 235 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | I _S | 2.7 | A |
| Pulsed Body Diode Forward Current (10µs Pulse, T _C = +25°C, Package Limited) | I _{SM} | 235 | A |
| Avalanche Current, L = 0.1mH | I _{AS} | 15.8 | A |
| Avalanche Energy, L = 0.1mH | E _{AS} | 12.5 | mJ |
| Avalanche Current, L = 3mH (Note 8) | I _{AS} | 7.5 | A |
| Avalanche Energy, L = 3mH (Note 8) | E _{AS} | 85 | mJ |

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

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5) | P _D | 2 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 75 | °C/W |
| Total Power Dissipation (Note 6) | P _D | 3.7 | W |
| | | | |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | 40 | °C/W |
| Thermal Resistance, Junction to Case | R _{θJC} | 2 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +175 | °C |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------------|-----|------|------|------|--|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| 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 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 2 | — | 4 | V | V _{DS} = V _{GS} , I _D = 250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 11.1 | 14 | mΩ | V _{GS} = 10V, I _D = 20A |
| | | — | 14.7 | 20 | | V _{GS} = 6V, I _D = 20A |
| Diode Forward Voltage | V _{SD} | — | 0.86 | 1.3 | V | V _{GS} = 0V, I _S = 20A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | — | 2343 | — | pF | V _{DS} = 50V, V _{GS} = 0V f = 1MHz |
| Output Capacitance | C _{oss} | — | 487 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 26 | — | | |
| Gate Resistance | R _g | — | 0.69 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge | Q _g | — | 30.1 | — | nC | V _{DD} = 50V, I _D = 10A, V _{GS} = 10V |
| Gate-Source Charge | Q _{gs} | — | 7.5 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 6.5 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 9.8 | — | ns | V _{DD} = 50V, V _{GS} = 10V, I _D = 10A, R _g = 6Ω |
| Turn-On Rise Time | t _r | — | 7.8 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 22.5 | — | | |
| Turn-Off Fall Time | t _f | — | 9.6 | — | | |
| Reverse Recovery Time | t _{RR} | — | 43 | — | ns | I _F = 10A, di/dt = 100A/µs |
| Reverse Recovery Charge | Q _{RR} | — | 65.1 | — | nC | |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

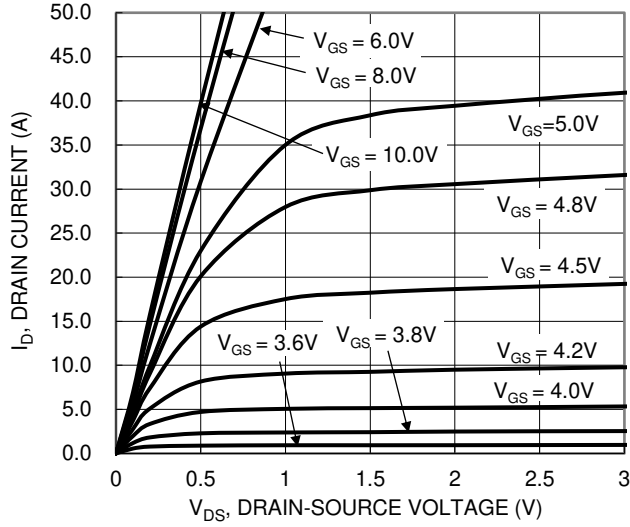


Figure 1. Typical Output Characteristic

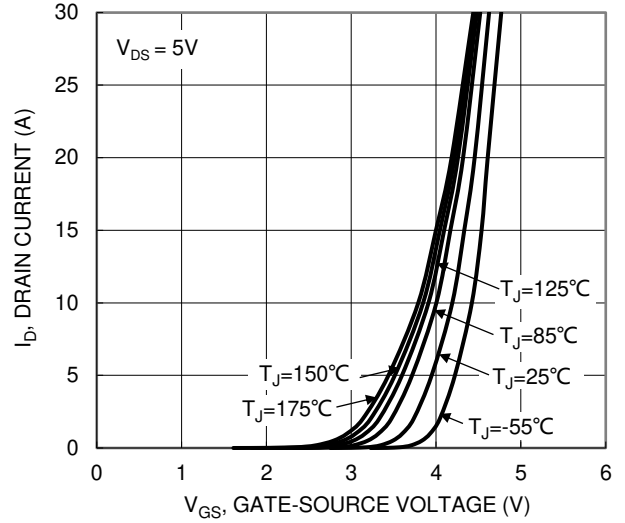


Figure 2. Typical Transfer Characteristic

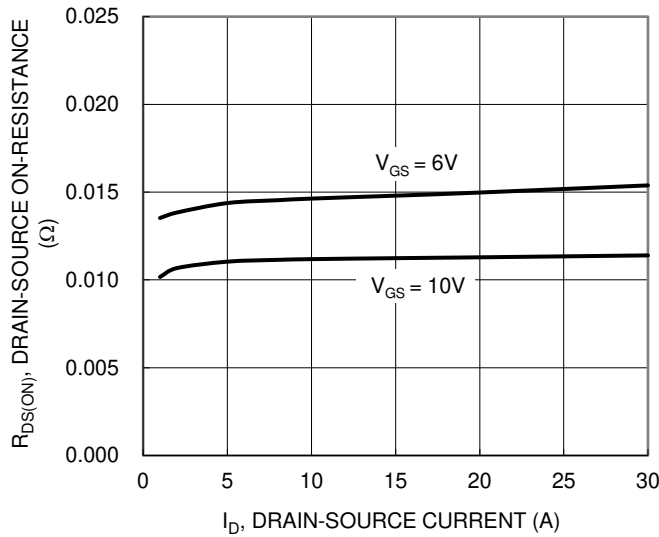


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

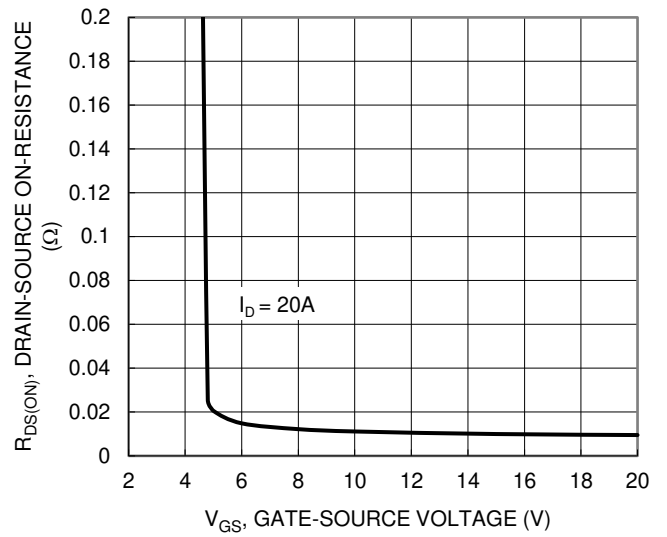


Figure 4. Typical Transfer Characteristic

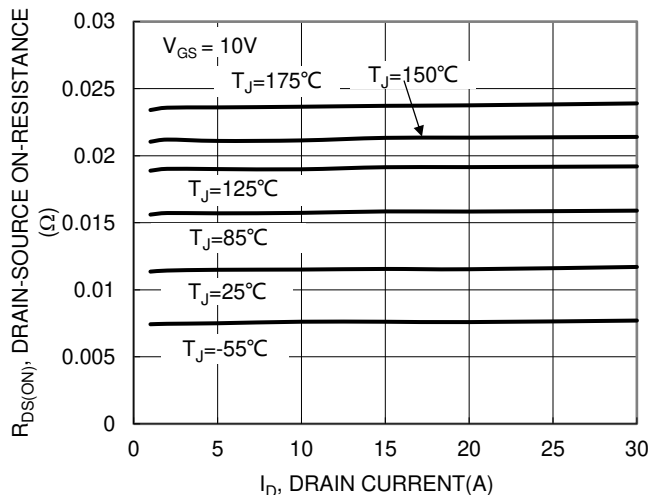


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

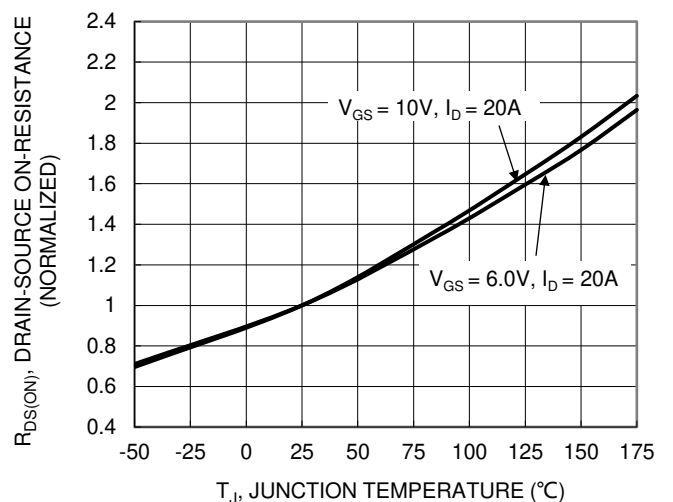


Figure 6. On-Resistance Variation with Temperature

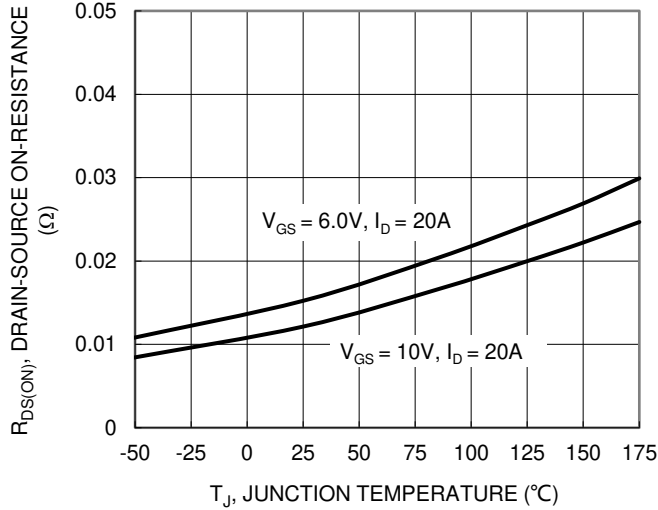


Figure 7. On-Resistance Variation with Temperature

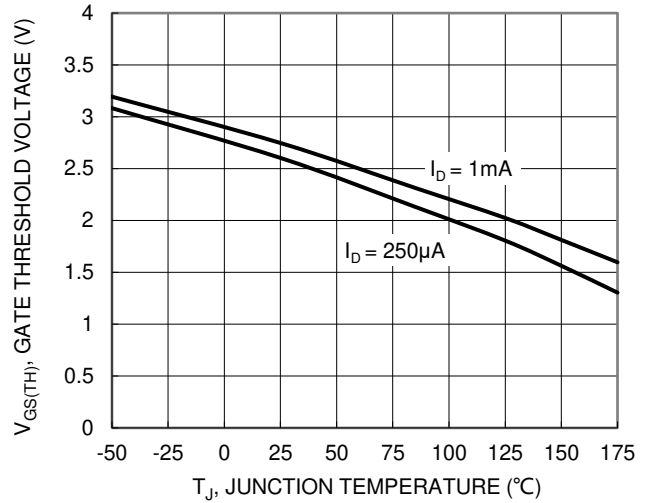


Figure 8. Gate Threshold Variation vs. Junction Temperature

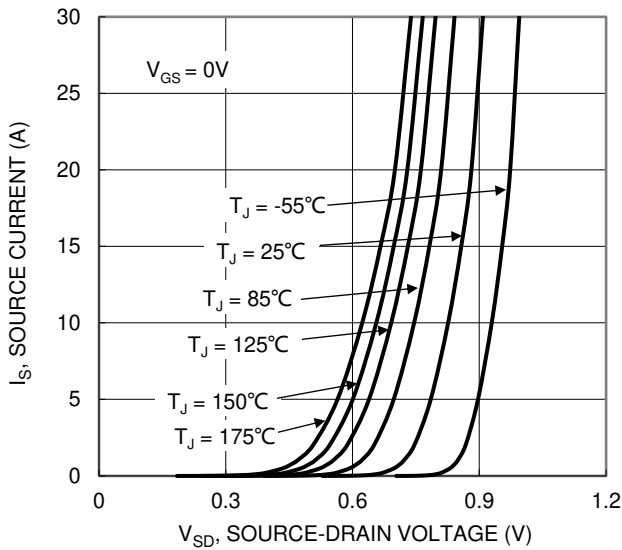


Figure 9. Diode Forward Voltage vs. Current

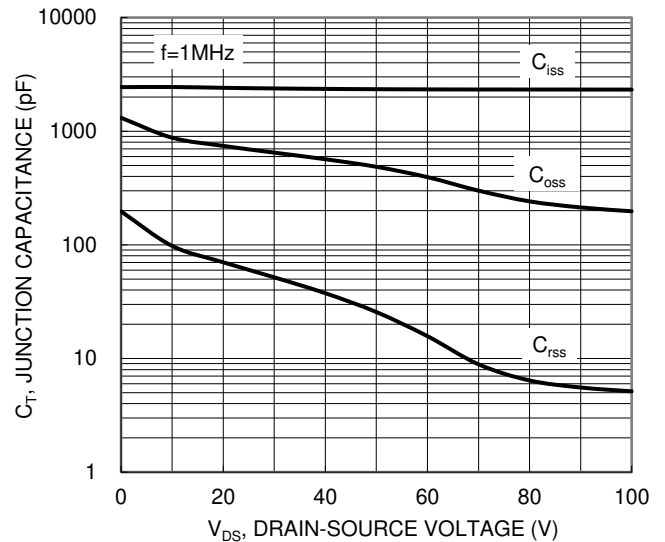


Figure 10. Typical Junction Capacitance

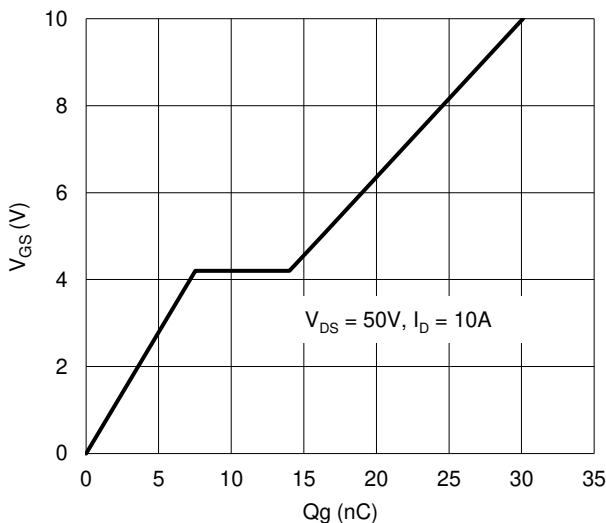


Figure 11. Gate Charge

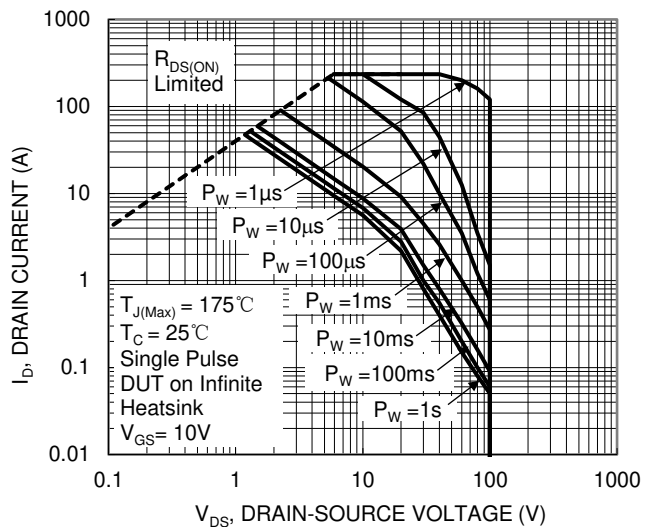


Figure 12. SOA, Safe Operation Area

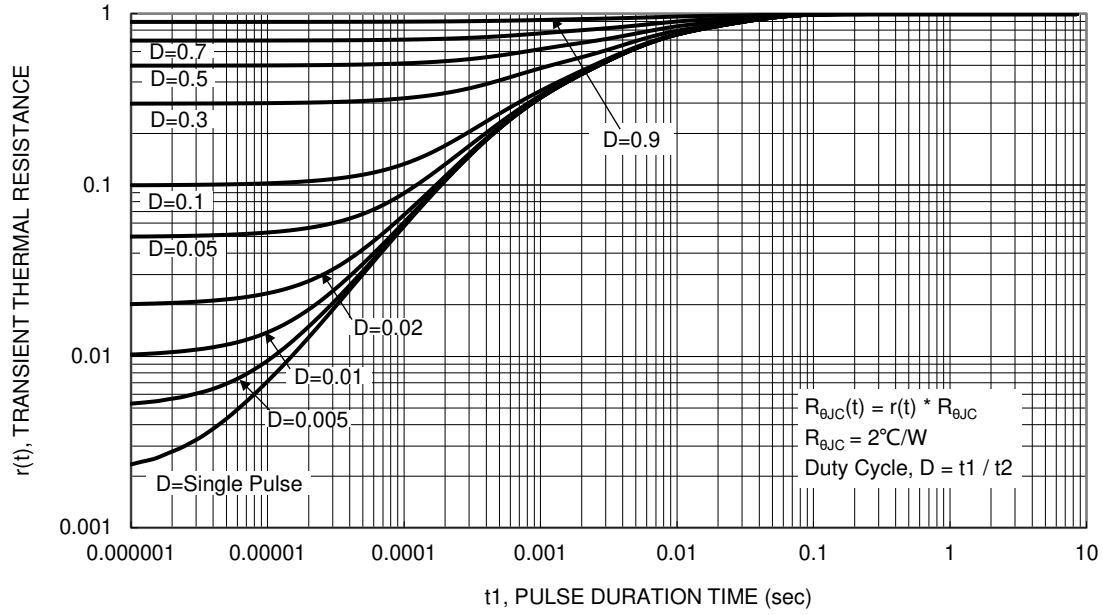
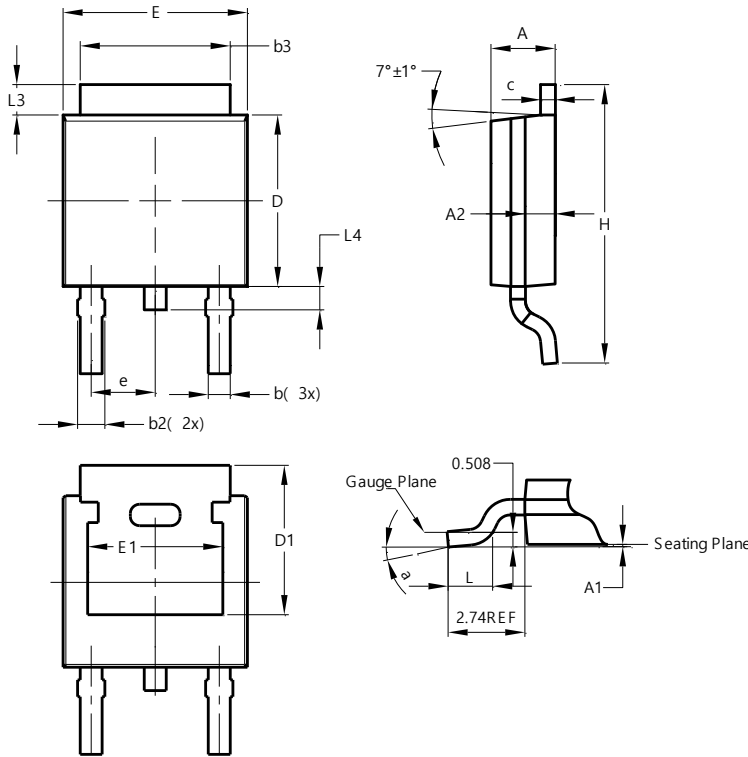


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

TO252 (DPAK)

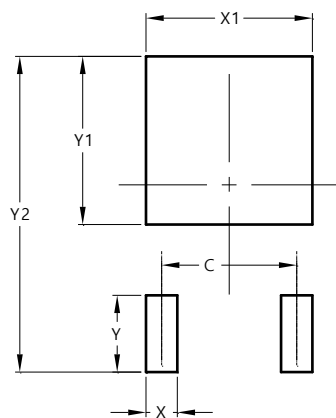


| TO252 (DPAK) | | | |
|-----------------------------|------|-------|-------|
| Dim | Min | Max | Typ |
| A | 2.19 | 2.39 | 2.29 |
| A1 | 0.00 | 0.13 | 0.08 |
| A2 | 0.97 | 1.17 | 1.07 |
| b | 0.64 | 0.88 | 0.783 |
| b2 | 0.76 | 1.14 | 0.95 |
| b3 | 5.21 | 5.46 | 5.33 |
| c | 0.45 | 0.58 | 0.531 |
| 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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