

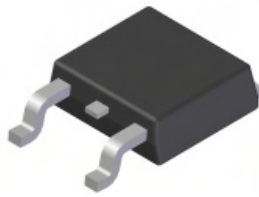
Product Summary

| BV _{DSS} | R _{DS(ON)} Max | I _D Max T _C = +25°C |
|-------------------|-------------------------------|--|
| 80V | 16mΩ @ V _{GS} = 10V | 50A |
| | 21mΩ @ V _{GS} = 4.5V | 43A |

Description and Applications

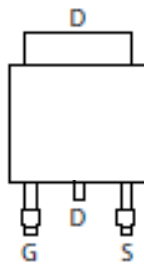
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Engine management units
- Motor controls
- DC-DC converters

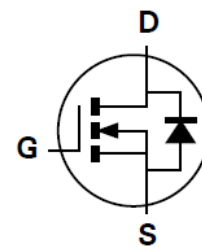


Top View

TO252 (DPAK)



Pinout Top View



Equivalent Circuit

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- Low R_{DS(ON)} – Ensures On-State Losses are Minimized
- High Conversion Efficiency
- Low Input Capacitance
- Fast Switching Speed
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **The DMTH8012LK3Q 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

- 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 Ⓔ3
- Weight: 0.33 grams (Approximate)

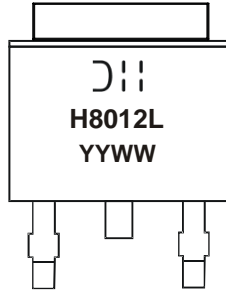
Ordering Information (Note 4)

| Orderable Part Number | Package | Packing | |
|-----------------------|--------------|---------|-------------|
| | | Qty. | Carrier |
| DMTH8012LK3Q-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

TO252 (DPAK)



$\text{D}|||$ = Manufacturer's Marking
 H8012L = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 25 = 2025)
 WW = Week Code (01 to 53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Units |
|---|-----------|----------------------------|-------|
| Drain-Source Voltage | V_{DSS} | 80 | V |
| Gate-Source Voltage | V_{GSS} | ± 20 | V |
| Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$ | I_D | $T_C = +25^\circ\text{C}$ | 50 |
| | | $T_C = +100^\circ\text{C}$ | 35 |
| Pulsed Source-Drain Diode Current (10 μs Pulse, Duty Cycle = 1%) | I_{SM} | 80 | A |
| Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%) | I_{DM} | 80 | A |
| Avalanche Energy, $L = 60\text{mH}$ | E_{AS} | 147 | mJ |

Thermal Characteristics

| Characteristic | Symbol | Value | Units |
|--|-----------------|-------------|---------------------------|
| Total Power Dissipation (Note 5) | P_D | 2.6 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 47 | $^\circ\text{C}/\text{W}$ |
| Total Power Dissipation (Note 6) | P_D | 119 | W |
| Thermal Resistance, Junction to Case (Note 6) | $R_{\theta JC}$ | 1.26 | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +175 | $^\circ\text{C}$ |

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 6. Device mounted on infinite heat sink and measured by thermal couple attached on bottom heat sink of package.

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} | 80 | — | — | V | V _{GS} = 0V, I _D = 1mA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | μA | V _{DS} = 64V, 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)} | — | 12.1 | 16 | mΩ | V _{GS} = 10V, I _D = 12A |
| | | — | 14.8 | 21 | | V _{GS} = 4.5V, I _D = 6A |
| Diode Forward Voltage | V _{SD} | — | 0.9 | 1.2 | V | V _{GS} = 0V, I _S = 25A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | — | 2051 | — | pF | V _{DS} = 40V, V _{GS} = 0V, f = 1MHz |
| Output Capacitance | C _{oss} | — | 189.9 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 24.6 | — | | |
| Gate Resistance | R _g | — | 0.44 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | — | 24.1 | — | nC | V _{DS} = 40V, I _D = 12A |
| Total Gate Charge (V _{GS} = 10V) | Q _g | — | 46.8 | — | | |
| Gate-Source Charge | Q _{gs} | — | 6.9 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 12.2 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 5.8 | — | ns | V _{DD} = 40V, V _{GS} = 10V, I _D = 12A, R _G = 1.6Ω |
| Turn-On Rise Time | t _r | — | 6.5 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 17.3 | — | | |
| Turn-Off Fall Time | t _f | — | 4.7 | — | | |
| Body Diode Reverse-Recovery Time | t _{RR} | — | 33.5 | — | ns | I _F = 12A, di/dt = 100A/μs |
| Body Diode Reverse-Recovery Charge | Q _{RR} | — | 38.9 | — | nC | |

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

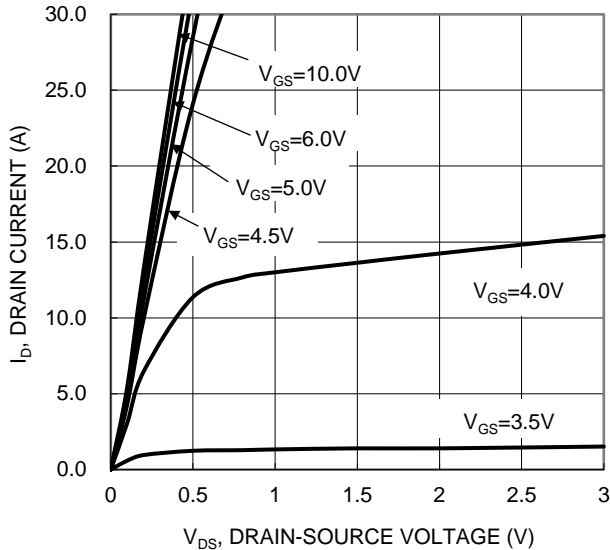


Figure 1. Typical Output Characteristic

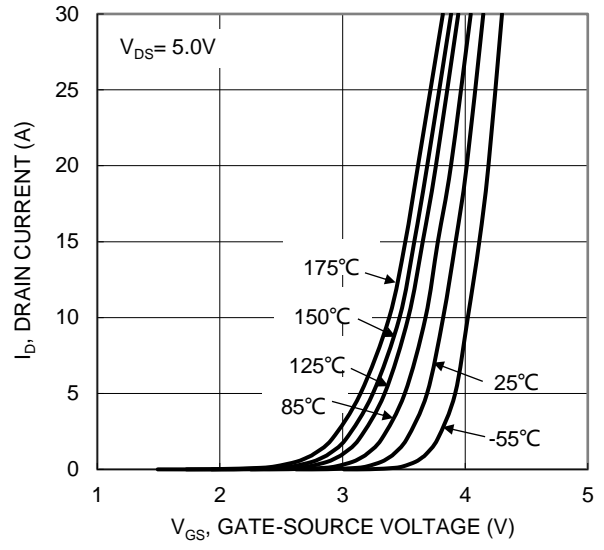


Figure 2. Typical Transfer Characteristic

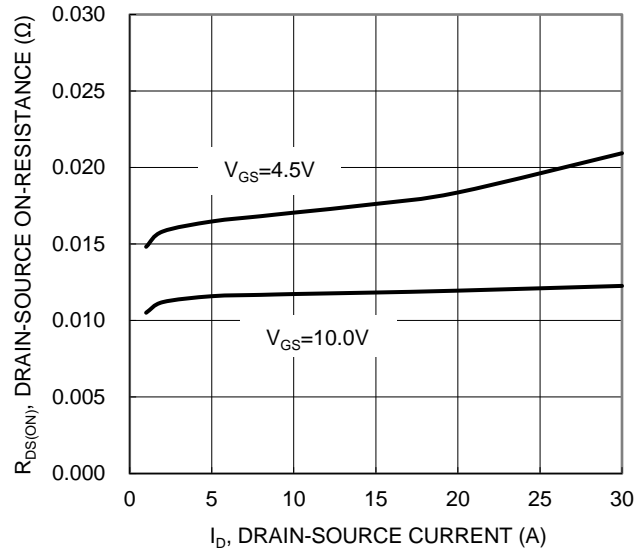


Figure 3. Typical On-Resistance vs Drain Current and Gate Voltage

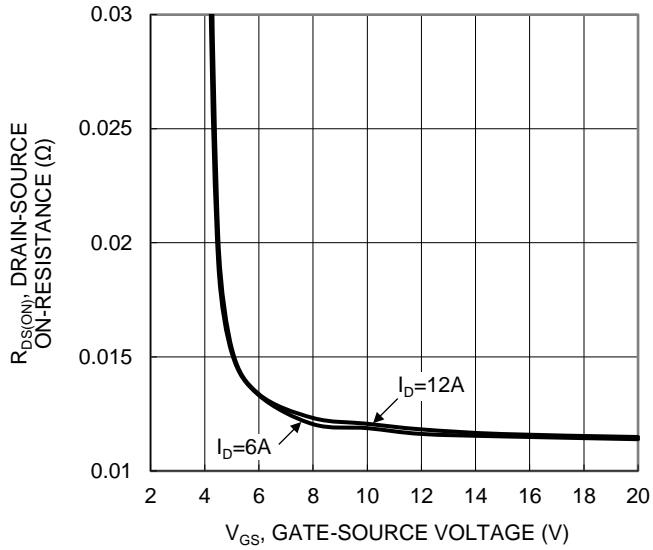


Figure 4. Typical Transfer Characteristic

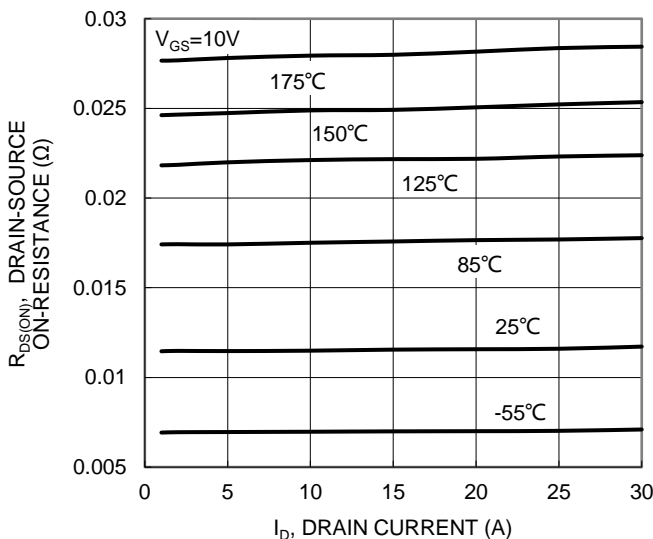


Figure 5. Typical On-Resistance vs Drain Current and Temperature

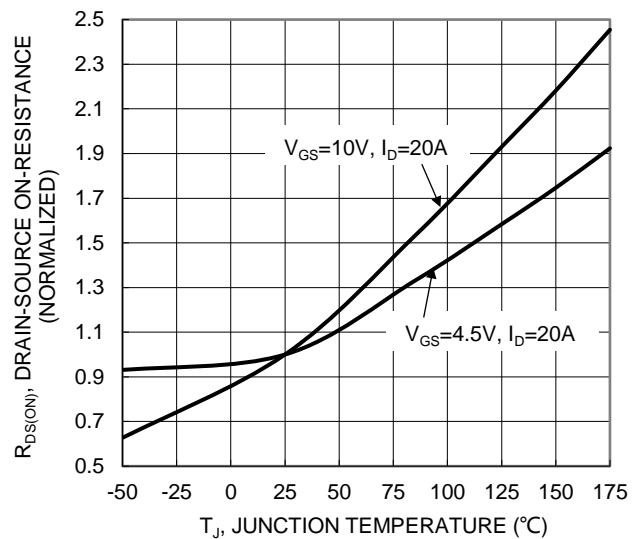


Figure 6. On-Resistance Variation with Temperature

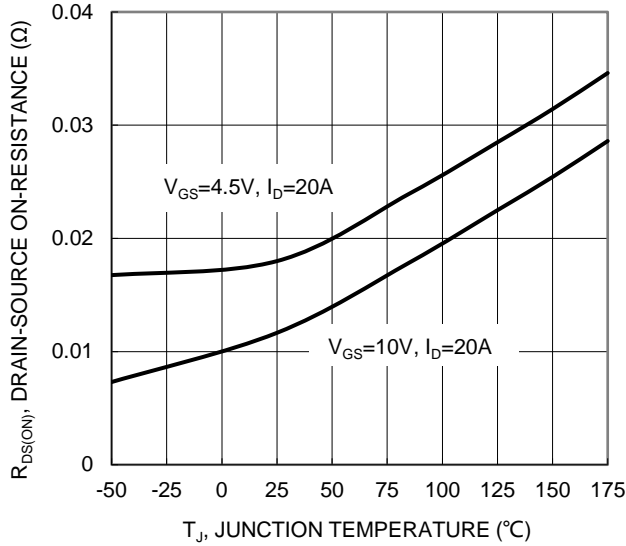


Figure 7. On-Resistance Variation with Temperature

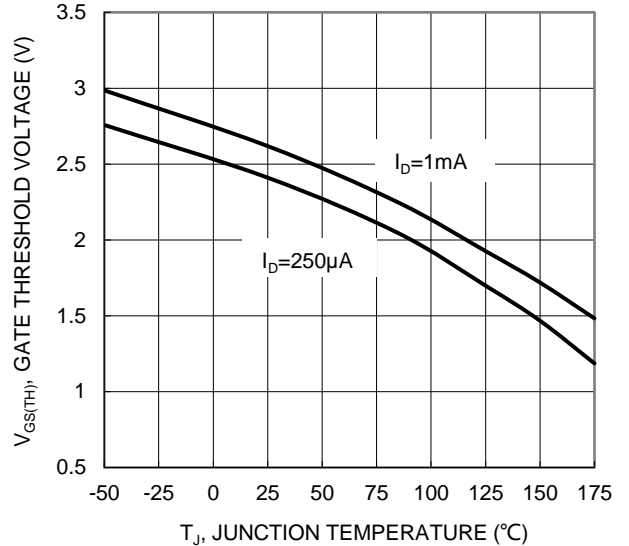


Figure 8. Gate Threshold Variation vs Temperature

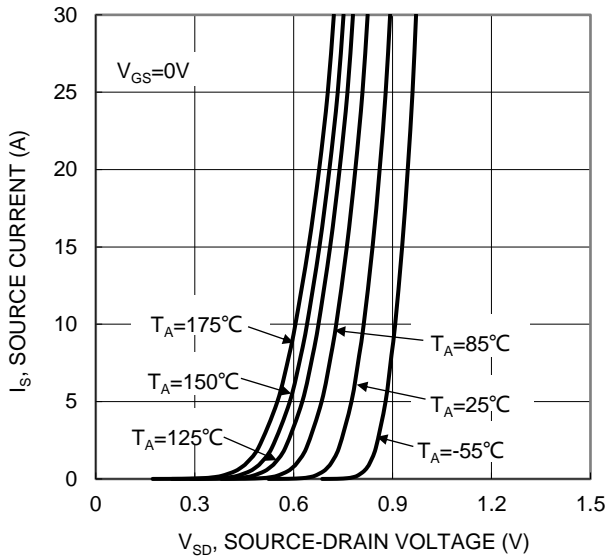


Figure 9. Diode Forward Voltage vs Current



Figure 10. Gate Charge

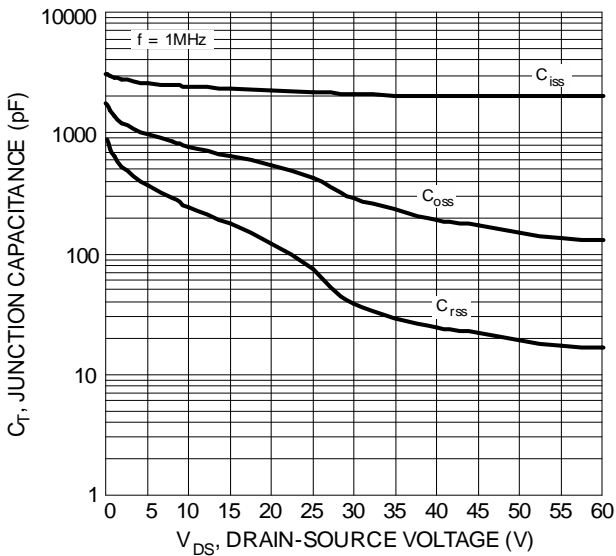


Figure 11. Typical Junction Capacitance

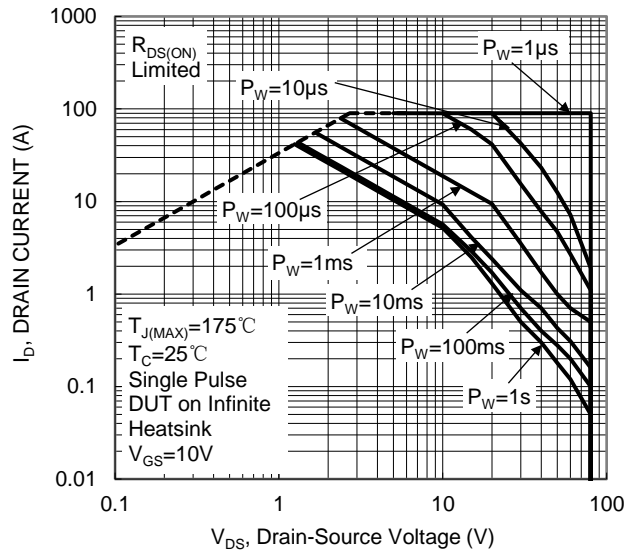


Figure 12. SOA, Safe Operation Area

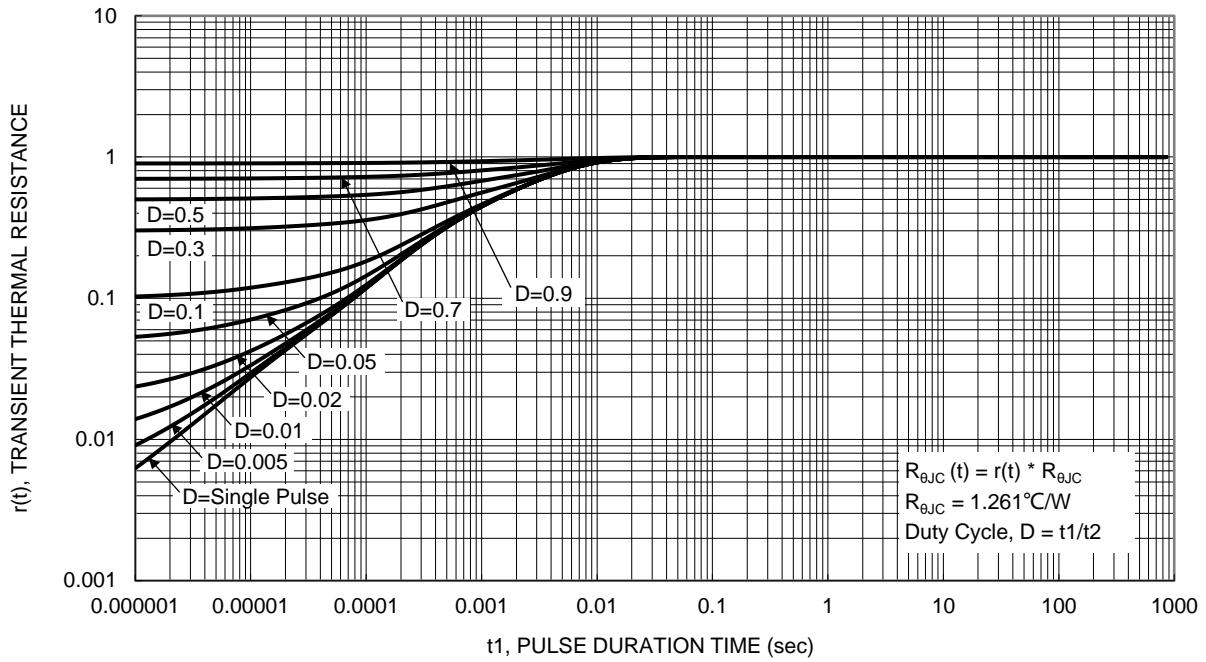
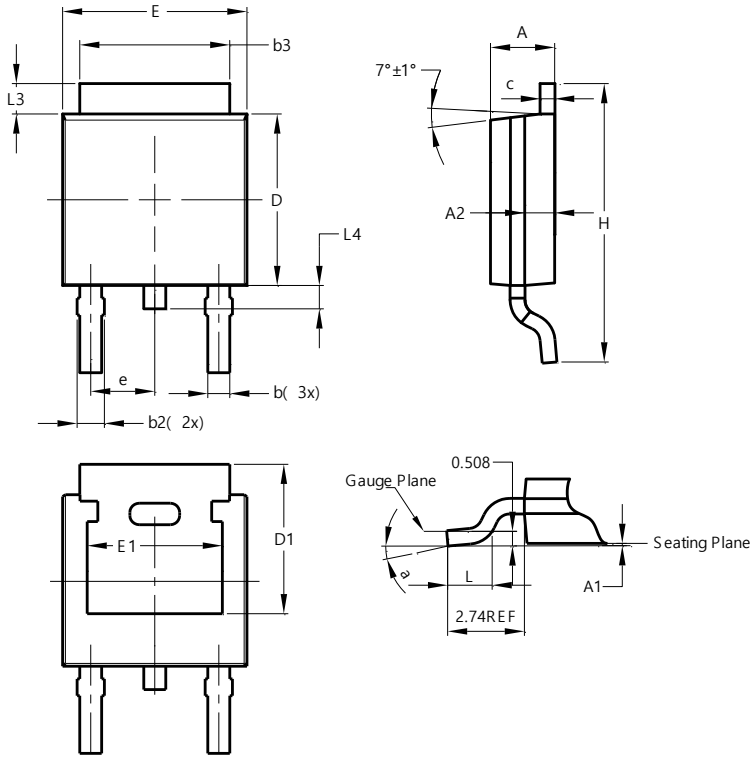


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

TO252 (DPAK)

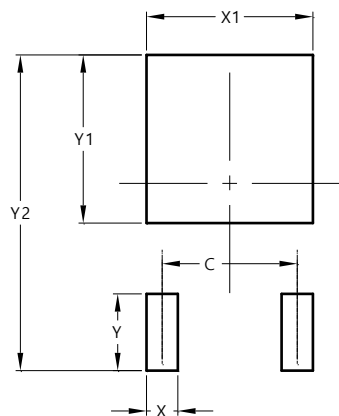


| TO252 (DPAK) | | | |
|-----------------------------|-----------|-------|-------|
| Dim | Min | Max | Typ |
| A | 2.19 | 2.39 | 2.29 |
| A1 | 0.00 | 0.13 | 0.08 |
| A2 | 0.97 | 1.17 | 1.07 |
| b | 0.64 | 0.88 | 0.783 |
| b2 | 0.76 | 1.14 | 0.95 |
| b3 | 5.21 | 5.50 | 5.33 |
| c | 0.45 | 0.58 | 0.531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