# 30V N-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max | $I_D$ $T_A$ = +25°C |
|---|---|---|
| 30V | 23mΩ @ $V_{GS}$ = 10V | 6.6A |
| | 30mΩ @ $V_{GS}$ = 4.5V | 5.8A |

## Features and Benefits

- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Description

This new generation 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.

## Applications

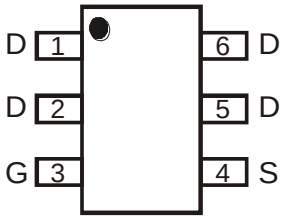
- DC-DC Converters
- Power management functions
- Backlighting

## Mechanical Data

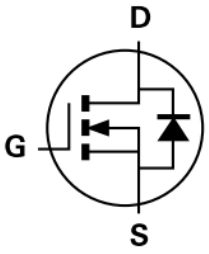
- Case: TSOT26
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.013 grams (Approximate)

**TSOT26**

Top View




Top View
Pin Configuration



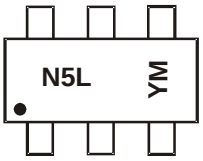

Equivalent Circuit

## Ordering Information (Note 5)

| Part Number | Case | Packaging |
|---|---|---|
| DMN3026LVTQ-7 | TSOT26 | 3,000/Tape & Reel |
| DMN3026LVTQ-13 | TSOT26 | 10,000/Tape & Reel |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_compliance_definitions/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

## Marking Information




N5L = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: A = 2013)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2010 | … | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | X | … | B | C | D | E | F | G | H | I | J |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

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

| Characteristic | | | Symbol | Value | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 30 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current (Note 7) $V_{GS}$ = 10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 6.6<br>5.3 | A |
| | t<10s | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 8.5<br>6.8 | A |
| Maximum Body Diode Forward Current (Note 7) | | | $I_S$ | 3.0 | A |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%) | | | $I_{DM}$ | 35 | A |

## Thermal Characteristics

| Characteristic | | Symbol | Value | Units |
|---|---|---|---|---|
| Total Power Dissipation (Note 6) | $T_A$ = +25°C | $P_D$ | 1.2 | W |
| | $T_A$ = +70°C | | 0.8 | |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady state | $R_{\theta JA}$ | 100 | °C/W |
| | t<10s | | 60 | °C/W |
| Total Power Dissipation (Note 7) | $T_A$ = +25°C | $P_D$ | 1.5 | W |
| | $T_A$ = +70°C | | 1.0 | |
| Thermal Resistance, Junction to Ambient (Note 7) | Steady state | $R_{\theta JA}$ | 83 | °C/W |
| | t<10s | | 50 | °C/W |
| Thermal Resistance, Junction to Case (Note 7) | | $R_{\theta JC}$ | 14.5 | °C/W |
| 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 | $BV_{DSS}$ | 30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1.0 | µA | $V_{DS}$ = 30V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 8)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1.0 | 1.5 | 2.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 19 | 23 | mΩ | $V_{GS}$ = 10V, $I_D$ = 6.5A |
| | | — | 22 | 30 | | $V_{GS}$ = 4.5V, $I_D$ = 6.0A |
| Diode Forward Voltage | $V_{SD}$ | — | 0.7 | 1.2 | V | $V_{GS}$ = 0V, $I_S$ = 1.0A |
| **DYNAMIC CHARACTERISTICS (Note 9)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 643 | — | pF | $V_{DS}$ = 15V, $V_{GS}$ = 0V<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 65 | — | | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 49 | — | | |
| Gate Resistance | $R_G$ | — | 2.5 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1.0MHz |
| Total Gate Charge ($V_{GS}$ = 4.5V) | $Q_g$ | — | 5.7 | — | nC | $V_{DS}$ = 15V, $I_D$ = 4.0A |
| Total Gate Charge ($V_{GS}$ = 10V) | $Q_g$ | — | 12.5 | — | | |
| Gate-Source Charge | $Q_{gs}$ | — | 1.7 | — | | |
| Gate-Drain Charge | $Q_{gd}$ | — | 1.8 | — | | |
| Turn-On Delay Time | $t_{D(on)}$ | — | 2.2 | — | nS | $V_{GS}$ = 10V, $V_{DD}$ = 15V, $R_G$ = 6.0Ω,<br>$I_D$= 6.5A |
| Turn-On Rise Time | $t_r$ | — | 2.5 | — | | |
| Turn-Off Delay Time | $t_{D(off)}$ | — | 12.1 | — | | |
| Turn-Off Fall Time | $t_f$ | — | 3.0 | — | | |
| Body Diode Reverse Recovery Time | $t_{rr}$ | — | 6.5 | — | nS | $I_F$ = 6.5A, dI/dt = 100A/µs |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | — | 1.7 | — | nC | $I_F$ = 6.5A, dI/dt = 100A/µs |

Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

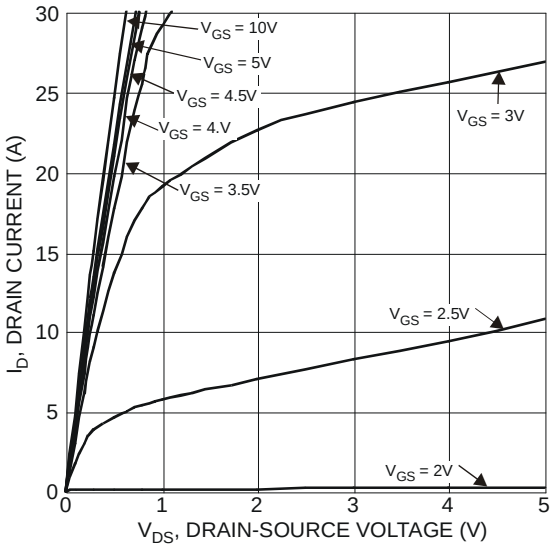



Figure 1 Typical Output Characteristics

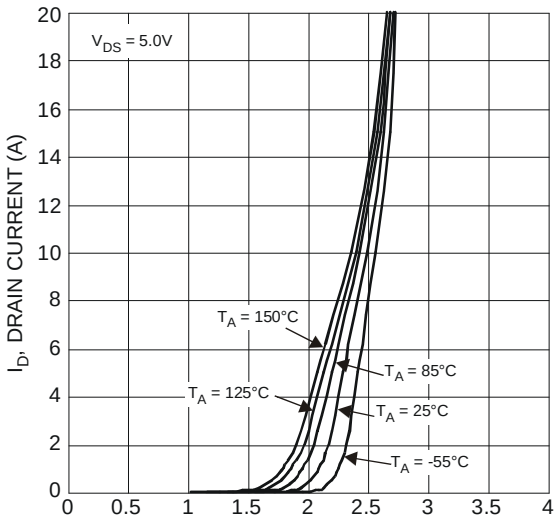



Figure 2 Typical Transfer Characteristics

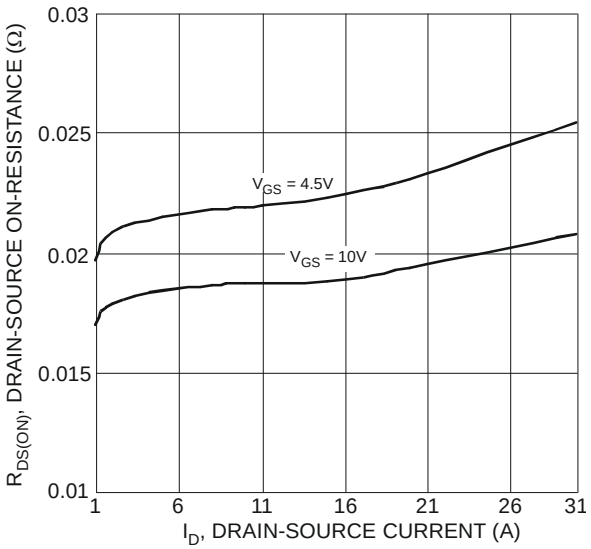



Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

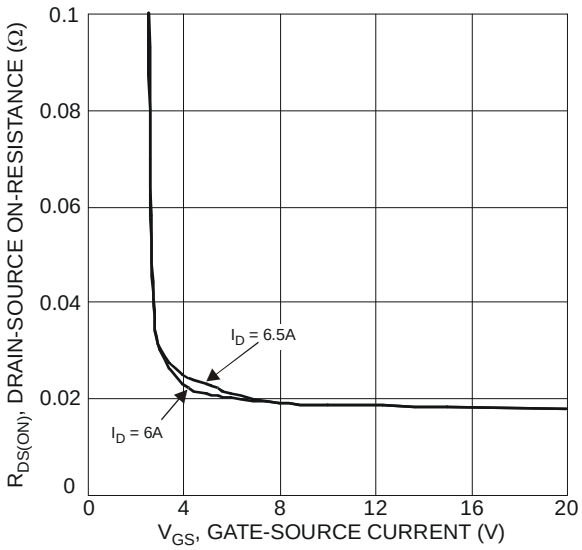



Figure 4 Typical Transfer Characteristics

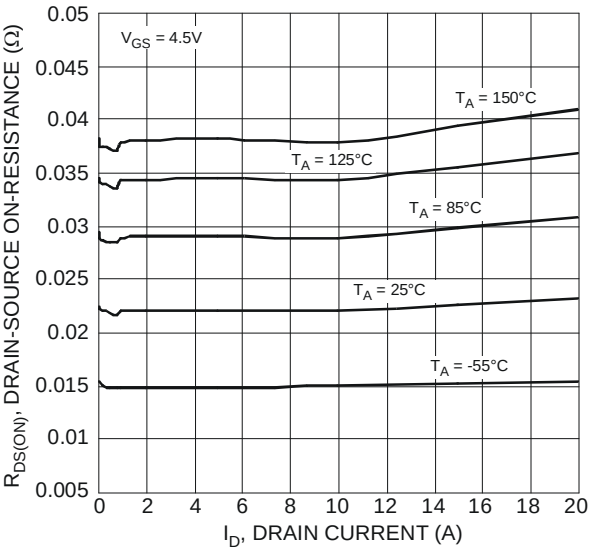



Figure 5 Typical On-Resistance vs. Drain Current and Temperature

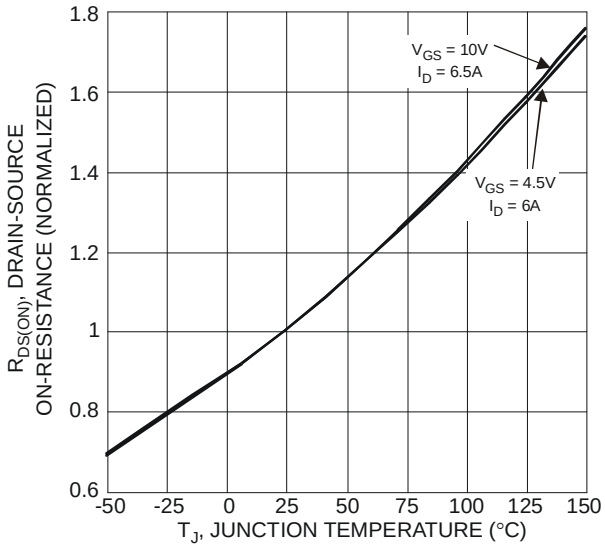



Figure 6 On-Resistance Variation with Temperature

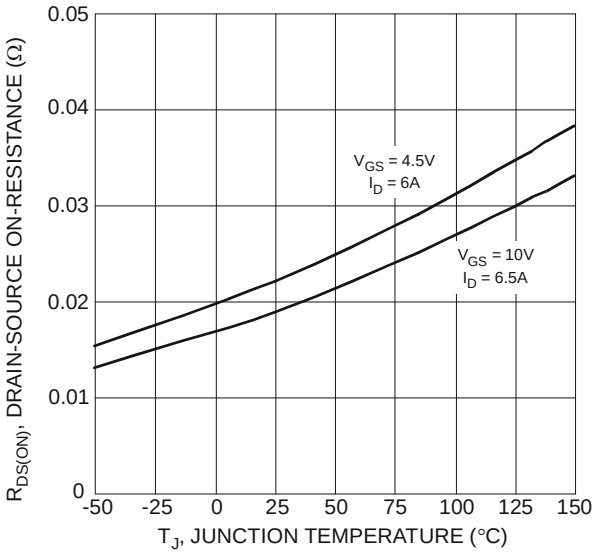



Figure 7 On-Resistance Variation with Temperature

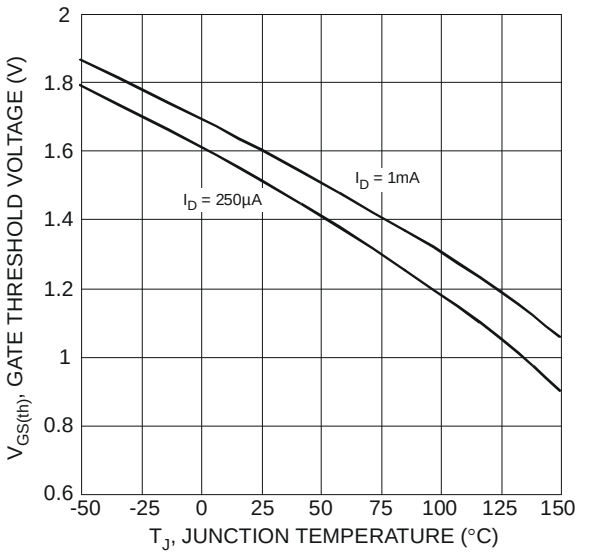



Figure 8 Gate Threshold Variation vs. Ambient Temperature

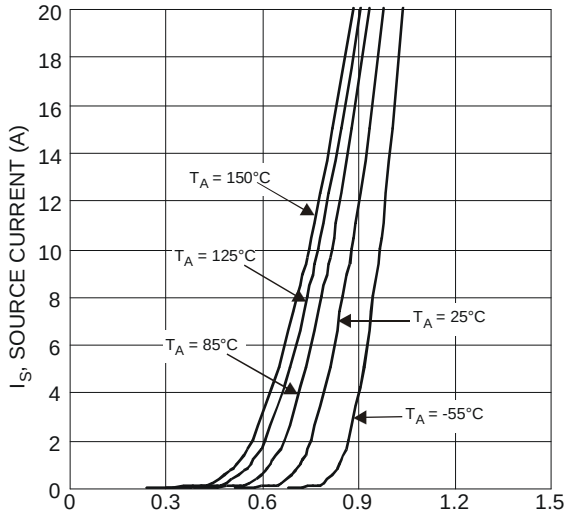



Figure 9 Diode Forward Voltage vs. Current

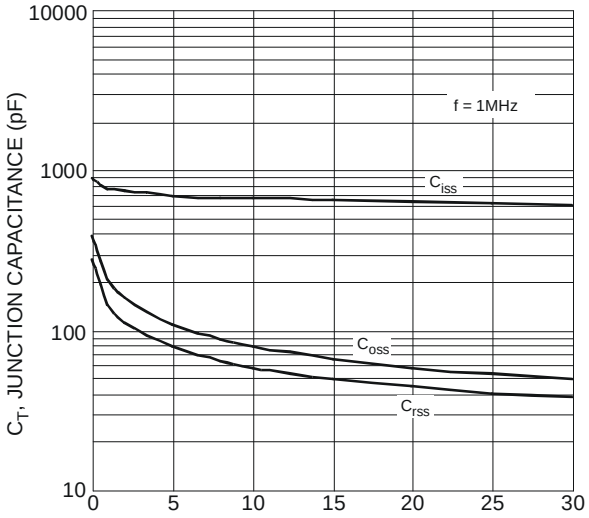



Figure 10 Typical Junction Capacitance

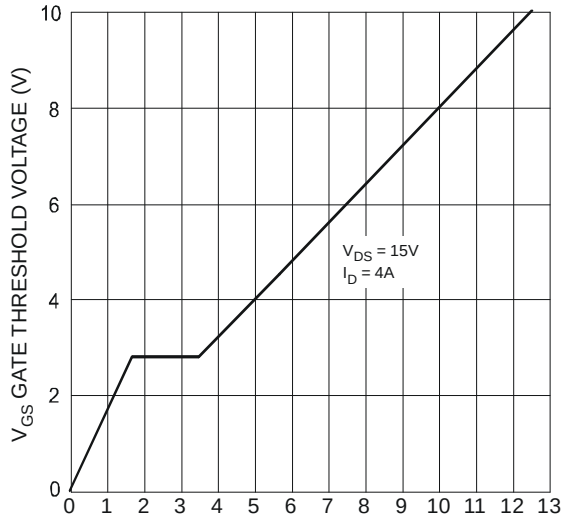



Figure 11 Gate Charge

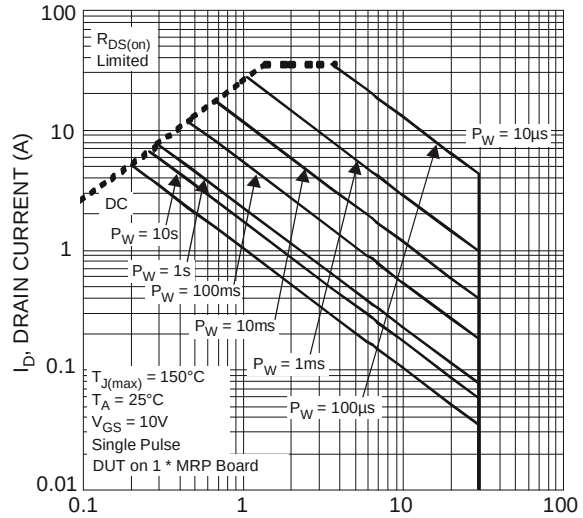



Figure 12 SOA, Safe Operation Area

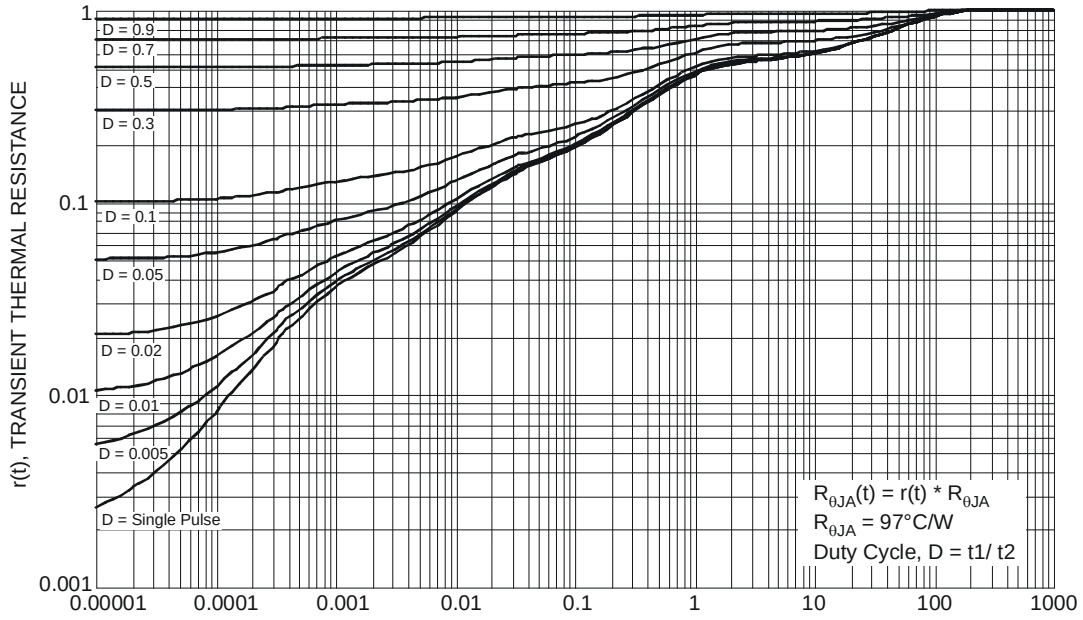
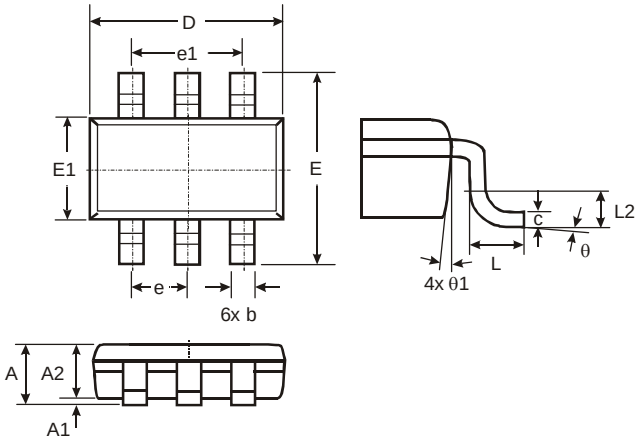



Figure 13 Transient Thermal Resistance

## Package Outline Dimensions

Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.

**TSOT26**

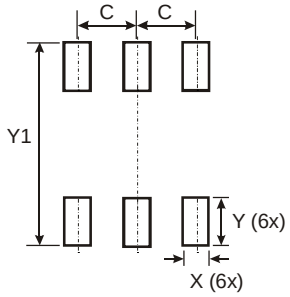



| TSOT26 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | — | 1.00 | — |
| **A1** | 0.01 | 0.10 | — |
| **A2** | 0.84 | 0.90 | — |
| **D** | — | — | 2.90 |
| **E** | — | — | 2.80 |
| **E1** | — | — | 1.60 |
| **b** | 0.30 | 0.45 | — |
| **c** | 0.12 | 0.20 | — |
| **e** | — | — | 0.95 |
| **e1** | — | — | 1.90 |
| **L** | 0.30 | 0.50 | — |
| **L2** | — | — | 0.25 |
| **θ** | 0° | 8° | 4° |
| **θ1** | 4° | 12° | — |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

**TSOT26**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 0.950 |
| **X** | 0.700 |
| **Y** | 1.000 |
| **Y1** | 3.199 |

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