Lead-free Green

# 100V N-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max | $I_D$ $T_A$ = +25°C |
|---|---|---|
| 100V | 220mΩ @ $V_{GS}$ = 10V | 1.6A |
| | 250mΩ @ $V_{GS}$ = 4.5V | 1.3A |

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **An automotive-compliant part is available under separate datasheet (DMN10H220LQ)**

## Mechanical Data

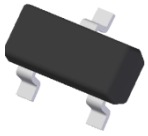
- Package: SOT23
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish—Matte Tin Annealed Over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.0072 grams (Approximate)

## Description and Applications

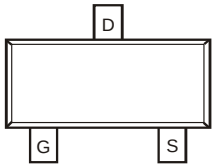
This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- Load switches

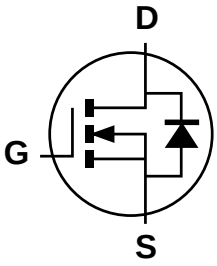
SOT23 (Standard)



Top View




Pin Configuration



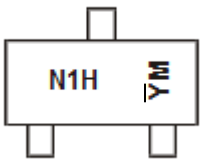

Equivalent Circuit

## Ordering Information

| Part Number | Package | Packing | |
|---|---|---|---|
| | | Qty. | Carrier |
| DMN10H220L-7 | SOT23 (Standard) | 3000 | Tape & Reel |
| DMN10H220L-13 | SOT23 (Standard) | 10,000 | Tape & Reel |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
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




N1H = Marking Code
$\overline{Y}$M = Date Code Marking
$\overline{Y}$ or Y = Year (ex: K = 2023)
M = M (ex: 9 = September)

Date Code Key

| Year | 2013 | … | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | A | … | K | L | M | N | P | R | S | T | U | V |

| 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 |


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

| Characteristic | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 100 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±16 | V |
| Continuous Drain Current (Note 5) $V_{GS}$ = 10V | (Note 6) | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 1.6<br>1.3 | A |
| | (Note 5) | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 1.4<br>1.1 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | | | $I_S$ | 0.6 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | | $I_{DM}$ | 8 | A |

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

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Total Power Dissipation (Note 6) | $T_A$ = +25°C | $P_D$ | 1.3 | W |
| | $T_A$ = +70°C | | 0.8 | |
| Thermal Resistance, Junction to Ambient | (Note 6) | $R_{\theta JA}$ | 94 | °C/W |
| | (Note 5) | | 177 | |
| 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 7)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 100 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1 | µA | $V_{DS}$ = 100V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ±16V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 1 | — | 2.5 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 160 | 220 | mΩ | $V_{GS}$ = 10V, $I_D$ = 1.6A |
| | | | 190 | 250 | | $V_{GS}$ = 4.5V, $I_D$ = 1.3A |
| Diode Forward Voltage | $V_{SD}$ | — | 0.7 | 1.2 | V | $V_{GS}$ = 0V, $I_S$ = 1.1A |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 401 | — | pF | $V_{DS}$ = 25V, $V_{GS}$ = 0V<br>f = 1MHz |
| Output Capacitance | $C_{oss}$ | — | 22 | — | | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 17 | — | | |
| Gate Resistance | $R_g$ | — | 2.1 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge ($V_{GS}$ = 4.5V) | $Q_g$ | — | 4.1 | — | nC | $V_{DS}$ = 50V, $I_D$ = 1.6A |
| Total Gate Charge ($V_{GS}$ = 10V) | $Q_g$ | — | 8.3 | — | | |
| Gate-Source Charge | $Q_{gs}$ | — | 1.5 | — | | |
| Gate-Drain Charge | $Q_{gd}$ | — | 2 | — | | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 6.8 | — | ns | $V_{DS}$ = 50V, $V_{GS}$ = 4.5V,<br>$R_G$ = 6.8Ω, $I_D$ = 1A |
| Turn-On Rise Time | $t_R$ | — | 8.2 | — | | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 7.9 | — | | |
| Turn-Off Fall Time | $t_F$ | — | 3.6 | — | | |
| Reverse Recovery Time | $t_{RR}$ | — | 17 | — | ns | $I_F$ = 1.1A, di/dt =100A/µs |
| Reverse Recovery Charge | $Q_{RR}$ | — | 9.8 | — | nC | |

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


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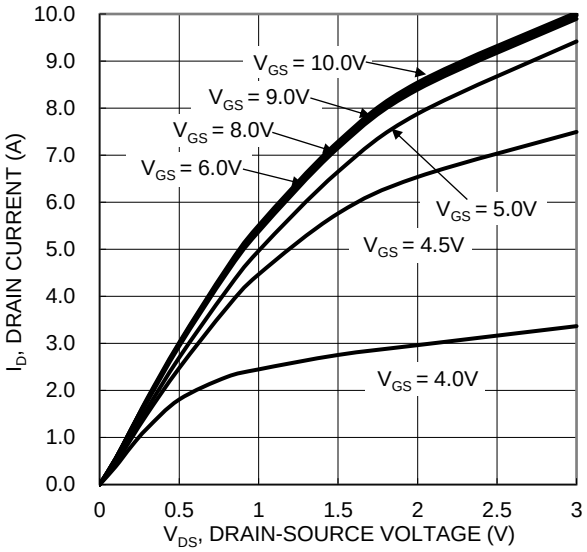



Figure 1. Typical Output Characteristic

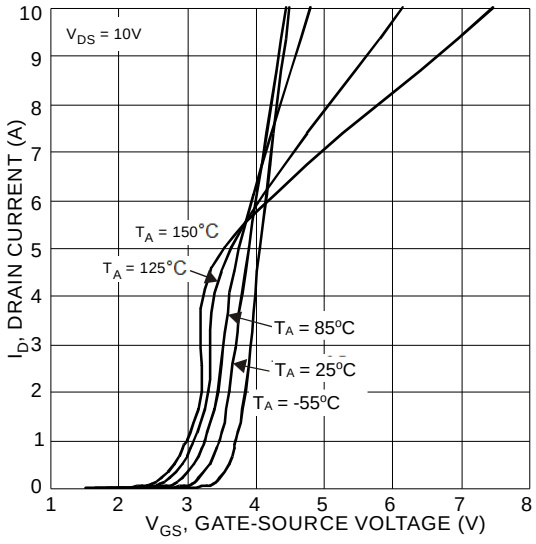



Figure 2 Typical Transfer Characteristics

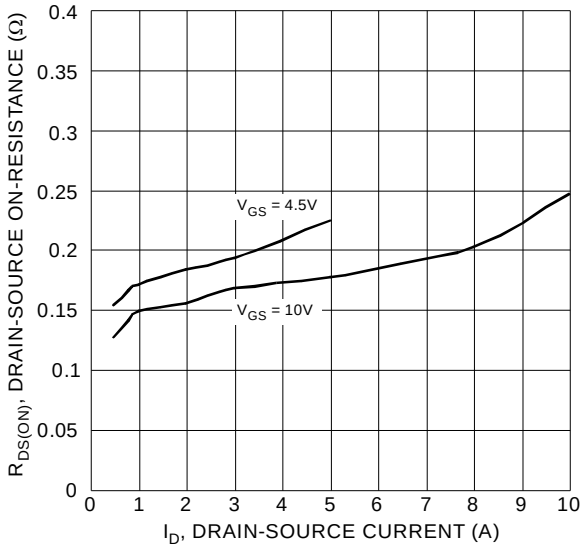



Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

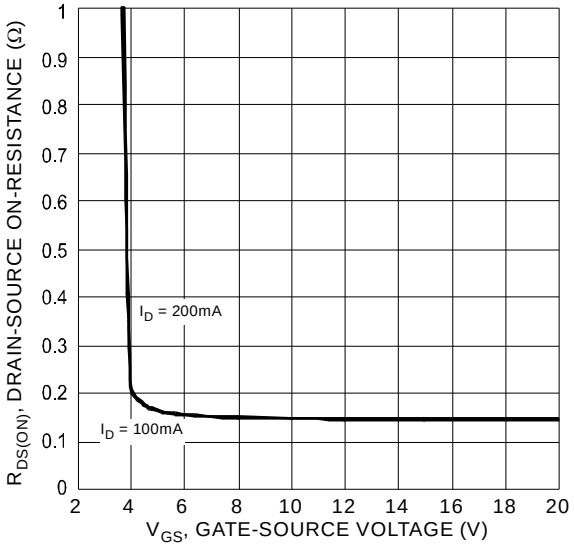



Figure 4 Typical Transfer Characteristic

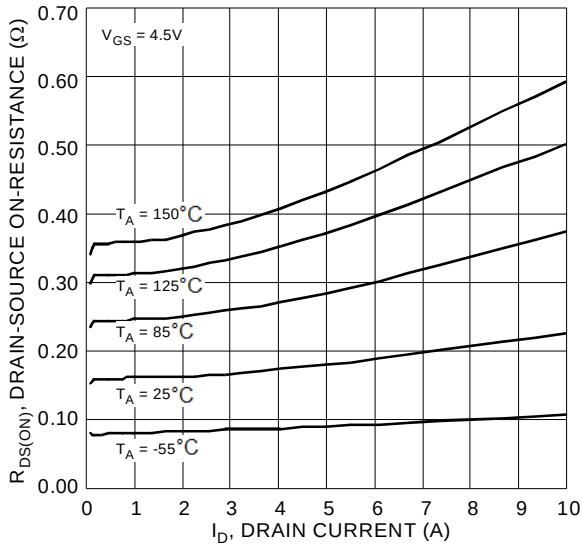



Figure 5 Typical On-Resistance vs. Drain Current and Temperature

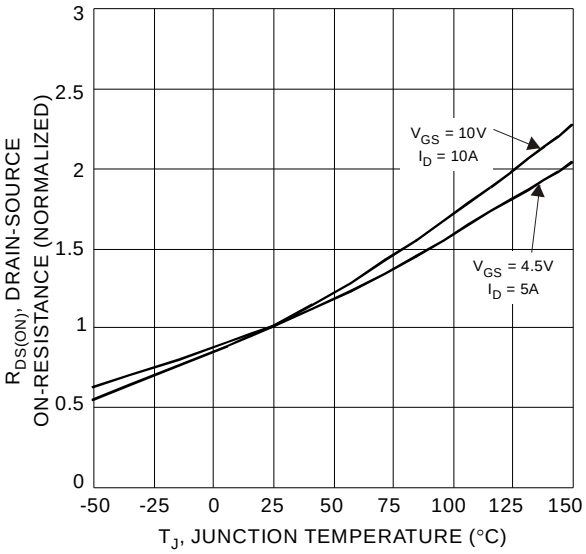



Figure 6 On-Resistance Variation with Temperature


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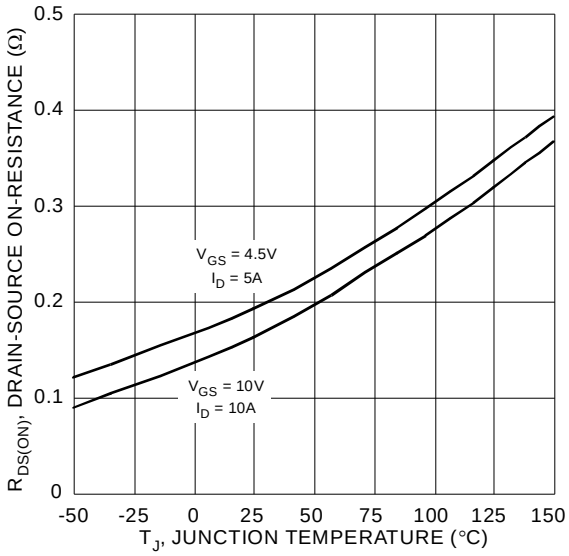



Figure 7 On-Resistance Variation with Temperature

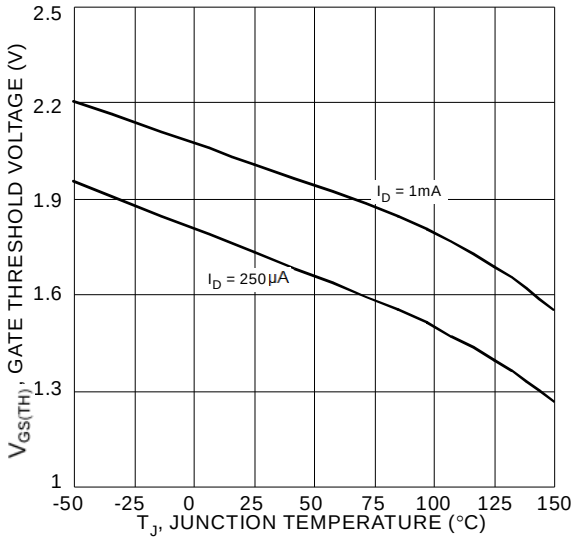



Figure 8 Gate Threshold Variation vs. Ambient Temperature

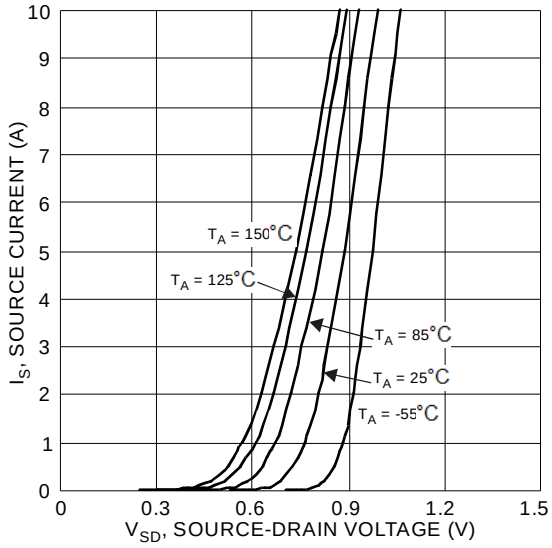



Figure 9 Diode Forward Voltage vs. Current

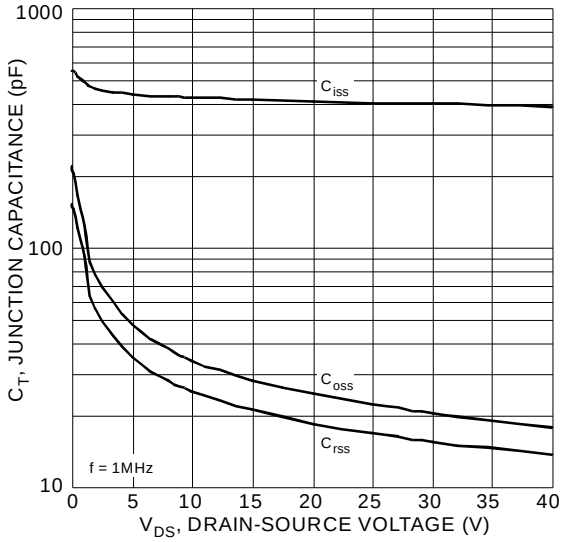



Figure 10 Typical Junction Capacitance

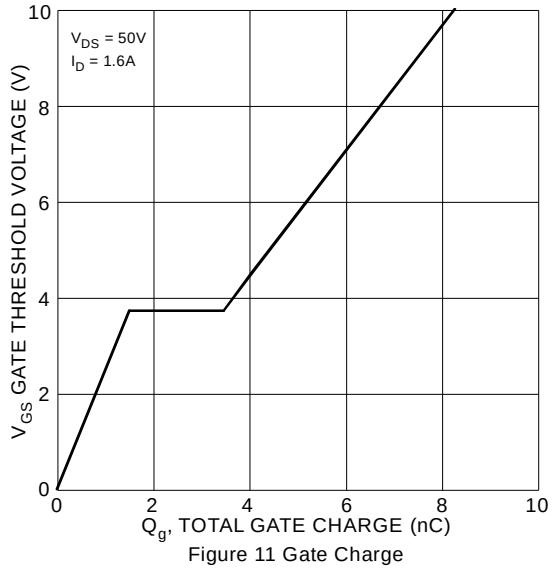



Figure 11 Gate Charge

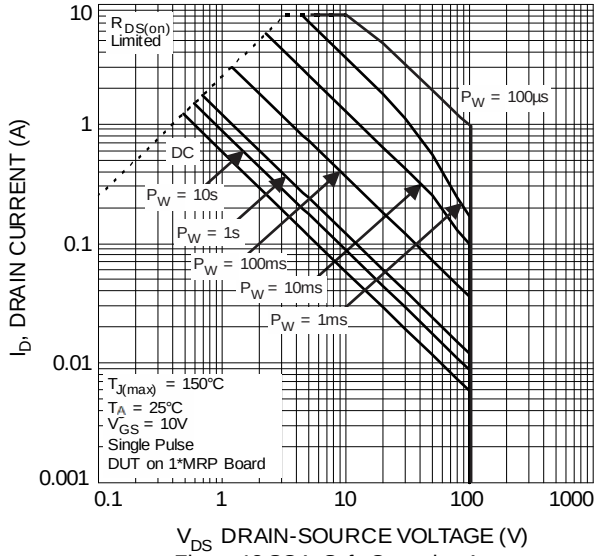



Figure 12 SOA, Safe Operation Area


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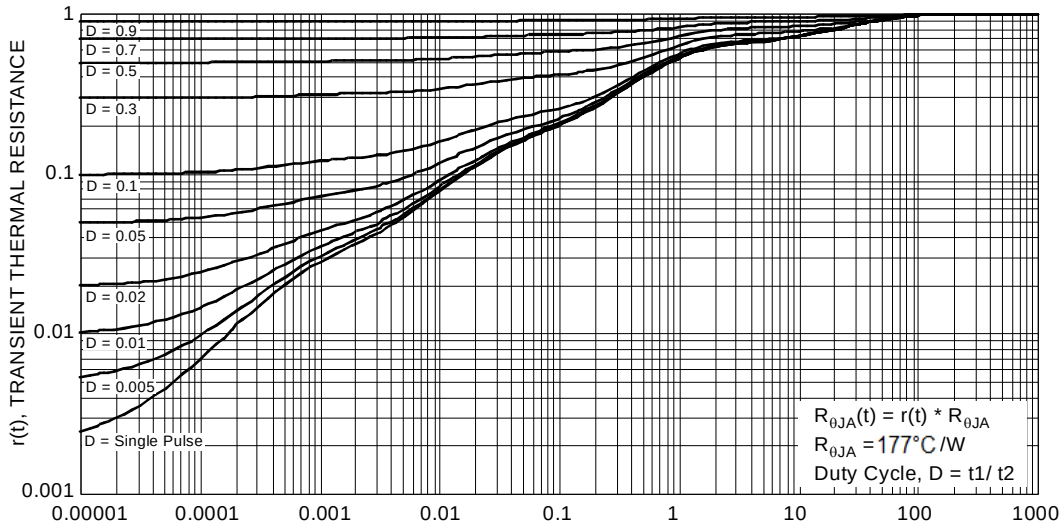


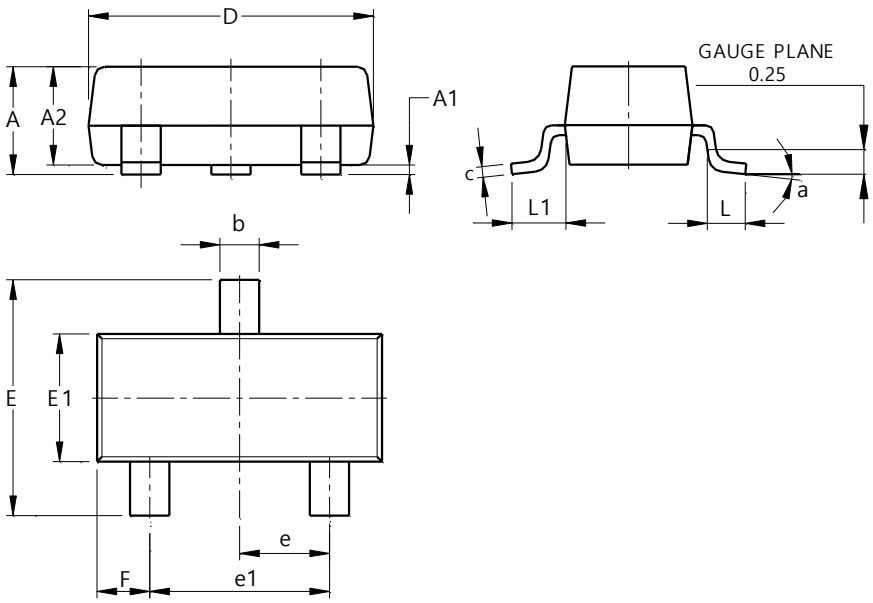

Figure 12 Transient Thermal Resistance


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## Package Outline Dimensions

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

**SOT23 (Standard)**

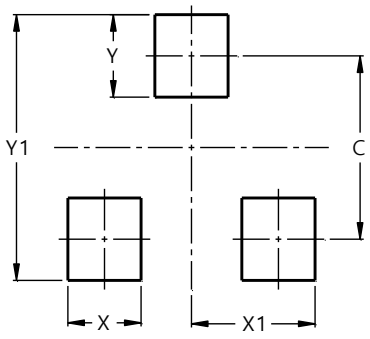



| SOT23 (Standard) | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.90 | 1.15 | 1.025 |
| **A1** | 0.00 | 0.10 | 0.05 |
| **A2** | 0.85 | 1.10 | 0.975 |
| **b** | 0.30 | 0.51 | 0.40 |
| **c** | 0.080 | 0.202 | 0.11 |
| **D** | 2.80 | 3.00 | 2.90 |
| **E** | 2.25 | 2.55 | 2.40 |
| **E1** | 1.20 | 1.40 | 1.30 |
| **e** | 0.89 | 1.03 | 0.915 |
| **e1** | 1.78 | 2.05 | 1.83 |
| **F** | 0.40 | 0.60 | 0.535 |
| **L1** | 0.45 | 0.61 | 0.55 |
| **L** | 0.25 | 0.55 | 0.40 |
| **a** | 0° | 8° | -- |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**SOT23 (Standard)**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 2.0 |
| **X** | 0.8 |
| **X1** | 1.35 |
| **Y** | 0.9 |
| **Y1** | 2.9 |


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