# 250V P-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ | $I_D$ $T_A$ = +25°C |
|---|---|---|
| -250V | 14Ω @ $V_{GS}$ = -10V | -265mA |
| | 18Ω @ $V_{GS}$ = -3.5V | -235mA |

## Features and Benefits

- High Voltage
- Low On-resistance
- Fast Switching Speed
- Low Gate Drive
- Low Threshold
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.**
  **https://www.diodes.com/quality/product-definitions/**
- **An Automotive-Compliant Part is Available Under Separate Datasheet (ZVP4525GQ)**

## Description and Applications

This new generation trench MOSFET features a unique structure combining the benefits of low on-resistance and fast switching, making it ideal for high efficiency power management applications.

- Earth recall and dialling switches
- Electronic hook switches
- High voltage power MOSFET drivers
- Telecom call routers
- Solid state relays

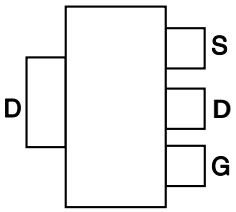
## Mechanical Data

- Package: SOT223
- Package Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish e3
- Weight: 0.112 grams (Approximate)

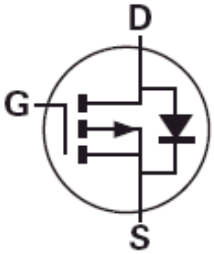
SOT223 (Type DN)



Top View




Pin Out - Top




Equivalent Circuit

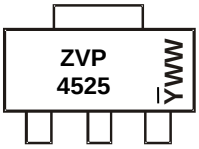
## Ordering Information (Note 4)

| Part Number | Package | Packing | |
|---|---|---|---|
| | | Qty. | Carrier |
| ZVP4525GTA | SOT223 (Type DN) | 1,000 | 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

SOT223 (Type DN)




ZVP4525 = Product Type Marking Code
YWW = Date Code Marking
Y = Last Digit of Year (ex: 2 = 2022)
WW = Week Code (01 to 53)


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

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | -250 | V |
| Gate-Source Voltage | $V_{GSS}$ | ±40 | V |
| Continuous Drain Current @$V_{GS}$ = 10V; $T_A$ = +25°C (Note 5)<br>@$V_{GS}$ = 10V; $T_A$ = +70°C (Note 5) | $I_D$ | -265<br>-212 | mA |
| Pulsed Drain Current (Note 7) | $I_{DM}$ | -1 | A |
| Continuous Source Current (Body Diode) | $I_S$ | -0.265 | A |
| Pulsed Source Current (Body Diode) | $I_{SM}$ | -1 | A |

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

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation at $T_A$ = +25°C (Note 5)<br>Linear Derating Factor | $P_D$ | 2.0<br>16 | W<br>mW/°C |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 63 | °C/W |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | 105 | °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** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -250 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -1mA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | -500 | nA | $V_{DS}$ = -250V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ±40V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | -0.8 | -1.5 | -2.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -1mA |
| Static Drain-Source On-Resistance (Note 8) | $R_{DS(ON)}$ | — | 10 | 14 | Ω | $V_{GS}$ = -10V, $I_D$ = -200mA |
| | | — | 13 | 18 | Ω | $V_{GS}$ = -3.5V, $I_D$ = -100mA |
| Forward Transconductance (Note 10) | $g_{fs}$ | 80 | 200 | — | mS | $V_{DS}$ = -10V, $I_D$ = -0.15A |
| Diode Forward Voltage (Note 8) | $V_{SD}$ | — | — | 0.97 | V | $I_S$ = -200mA, $V_{GS}$ = 0V, $T_J$ = +25°C |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance (Note 10) | $C_{iss}$ | — | 82 | — | pF | $V_{DS}$ = -25V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance (Note 10) | $C_{oss}$ | — | 16 | — | pF | |
| Reverse Transfer Capacitance (Note 10) | $C_{rss}$ | — | 5 | — | pF | |
| Total Gate Charge (Notes 9 &10) | $Q_g$ | — | 3 | — | nC | $V_{GS}$ = -10V, $V_{DS}$ = -25V, $I_D$ = -200mA |
| Gate-Source Charge (Notes 9 &10) | $Q_{gs}$ | — | 0.3 | — | nC | |
| Gate-Drain Charge (Notes 9 &10) | $Q_{gd}$ | — | 0.5 | — | nC | |
| Turn-On Delay Time (Notes 9 & 10) | $t_{D(ON)}$ | — | 1.5 | — | ns | $V_{DD}$ = -30V, $I_D$ = -200mA, $V_{GS}$ = -10V, $R_G$ = 50Ω |
| Turn-On Rise Time (Notes 9 & 10) | $t_R$ | — | 4.2 | — | ns | |
| Turn-Off Delay Time (Notes 9 & 10) | $t_{D(OFF)}$ | — | 27 | — | ns | |
| Turn-Off Fall Time (Notes 9 & 10) | $t_F$ | — | 10 | — | ns | |
| Reverse Recovery Time (Note 10) | $t_{RR}$ | — | 80 | — | ns | $I_F$ = -1A, di/dt = 100A/µs, $T_J$ = +25°C |
| Reverse Recovery Charge (Note 10) | $Q_{RR}$ | — | 230 | — | nC | |

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
7. Repetitive rating 25mm x 25mm FR4 PCB, D=0.02 pulse width=300µs - pulse width limited by maximum junction temperature.
8. Measured under pulsed conditions. Pulse width ≤ 300µs; duty cycle ≤ 2%.
9. Switching characteristics are independent of operating junction temperature.
10. For design aid only, not subject to production testing.


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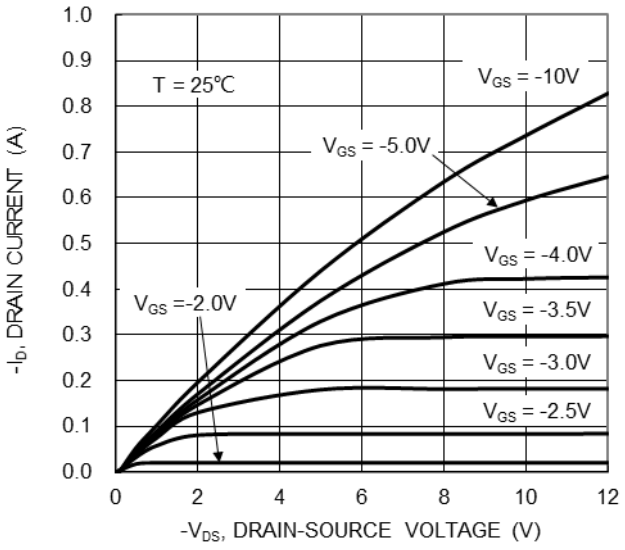



Figure 1. Typical Output Characteristic

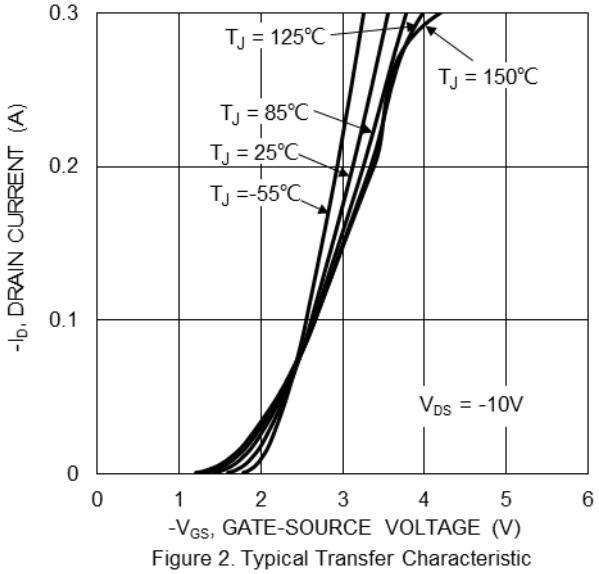



Figure 2. Typical Transfer Characteristic

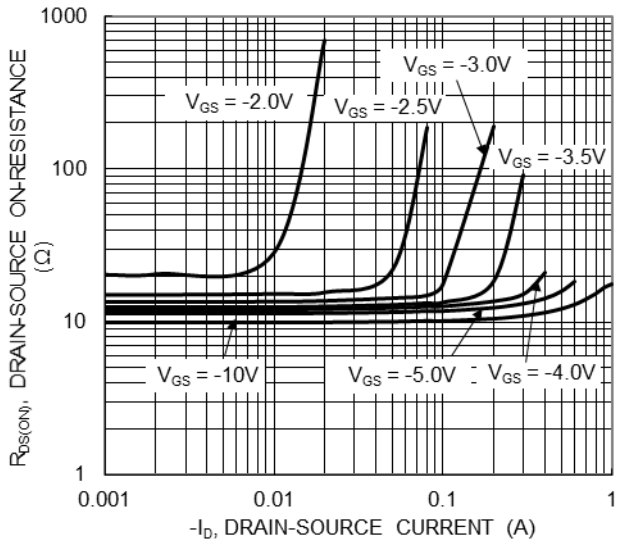



Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

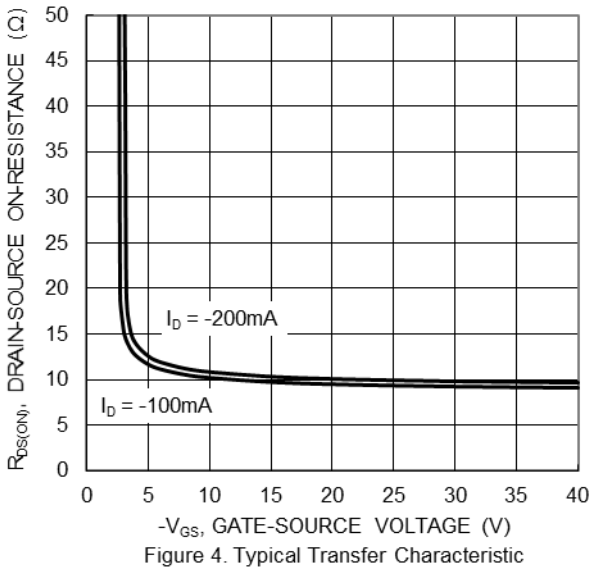



Figure 4. Typical Transfer Characteristic

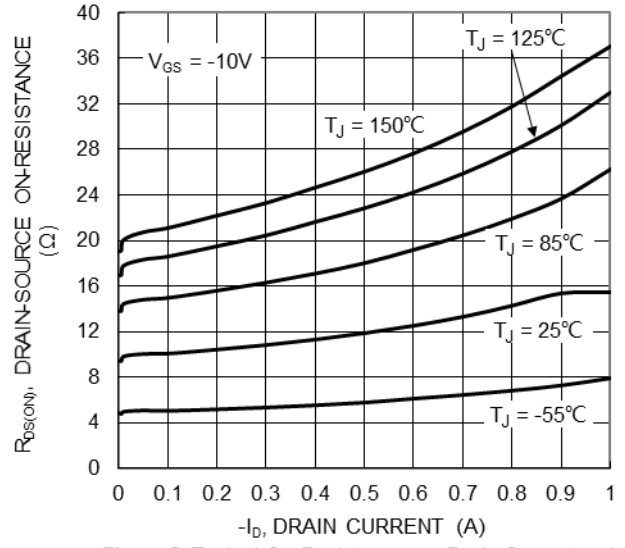



Figure 5. Typical On-Resistance vs. Drain Current and Temperature

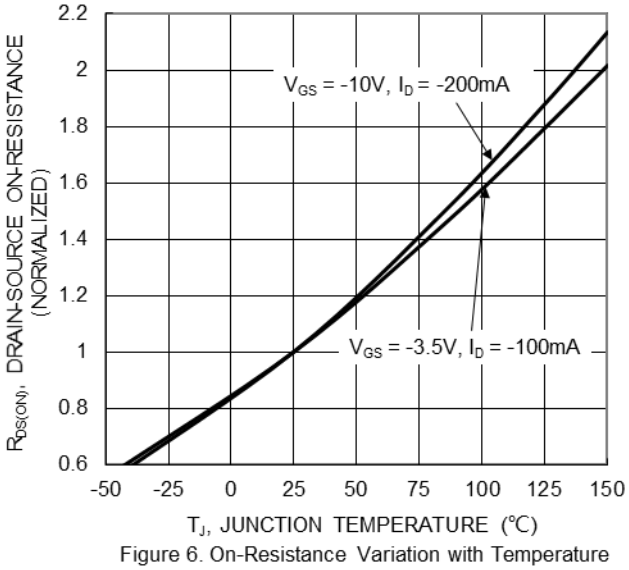



Figure 6. On-Resistance Variation with Temperature


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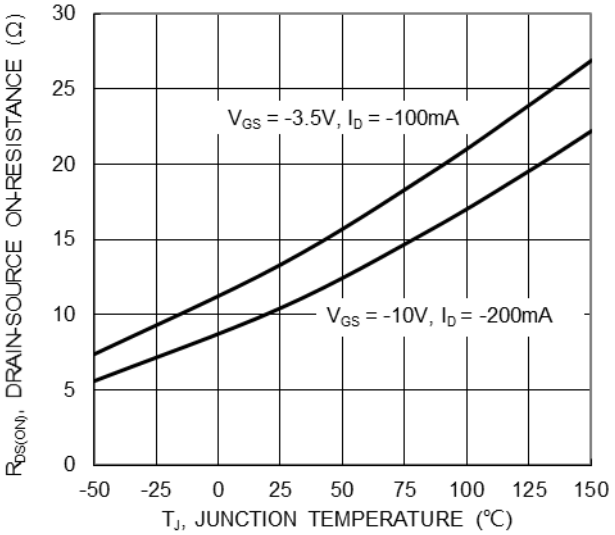



Figure 7. On-Resistance Variation with Temperature

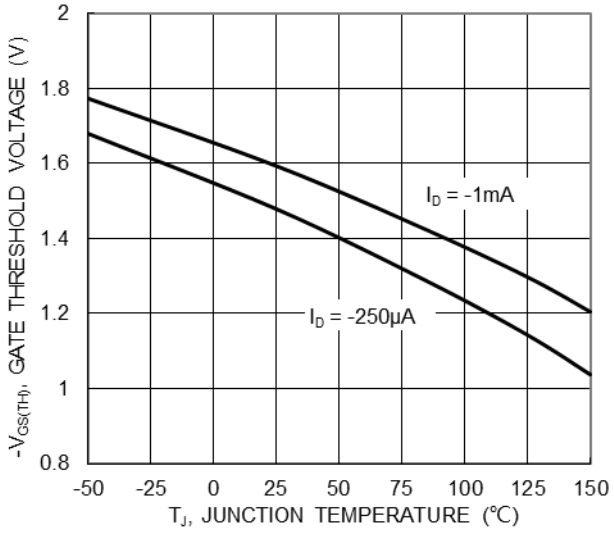



Figure 8. Gate Threshold Variation vs. Junction Temperature

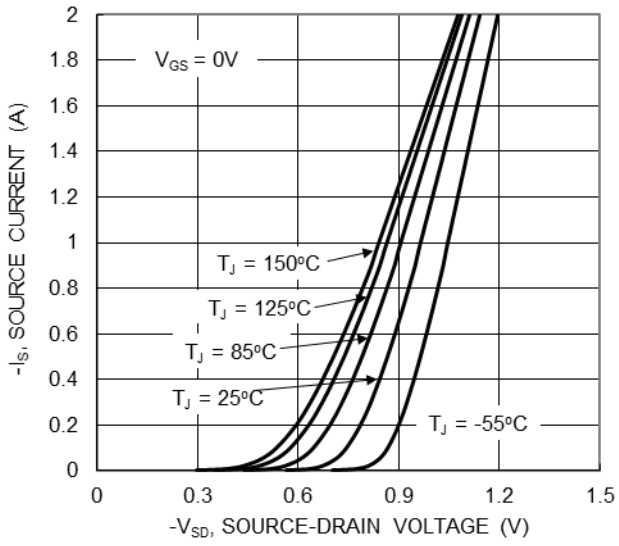



Figure 9. Diode Forward Voltage vs. Current

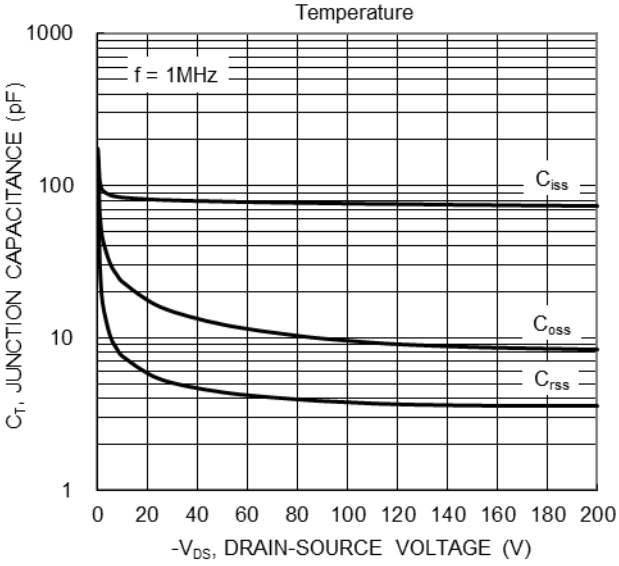



Figure 10. Typical Junction Capacitance

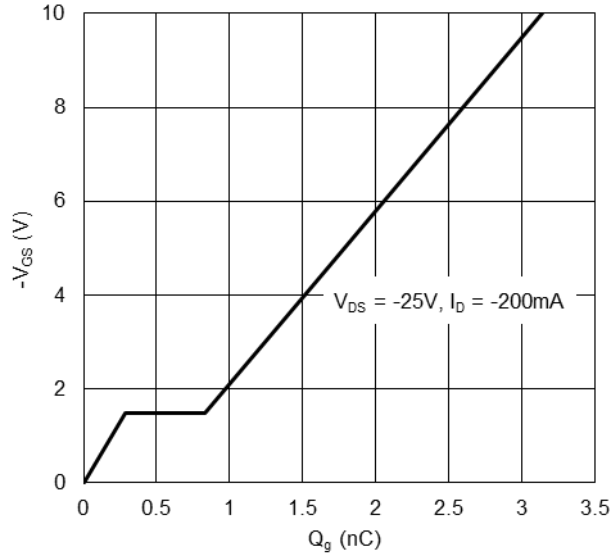



Figure 11. Gate Charge

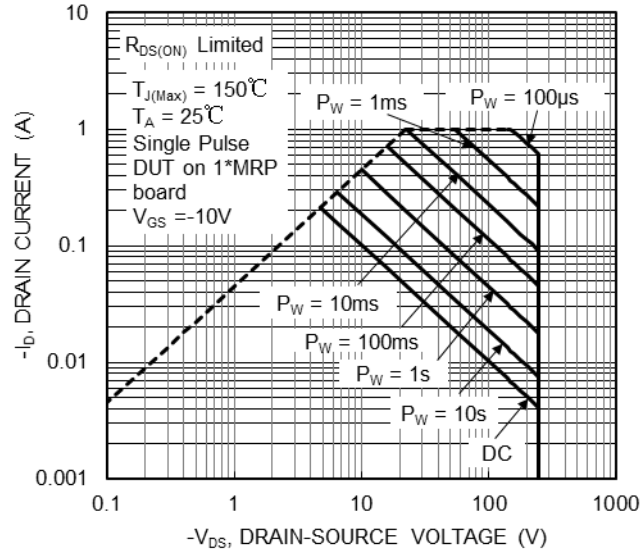



Figure 12. SOA, Safe Operation Area


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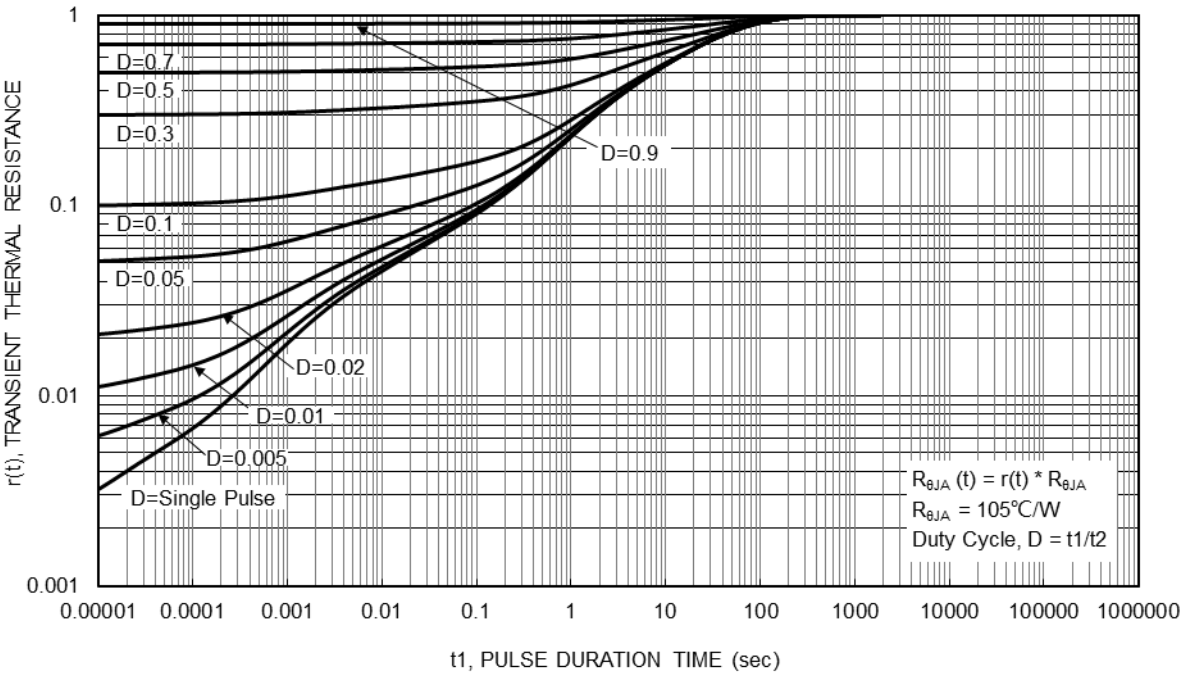


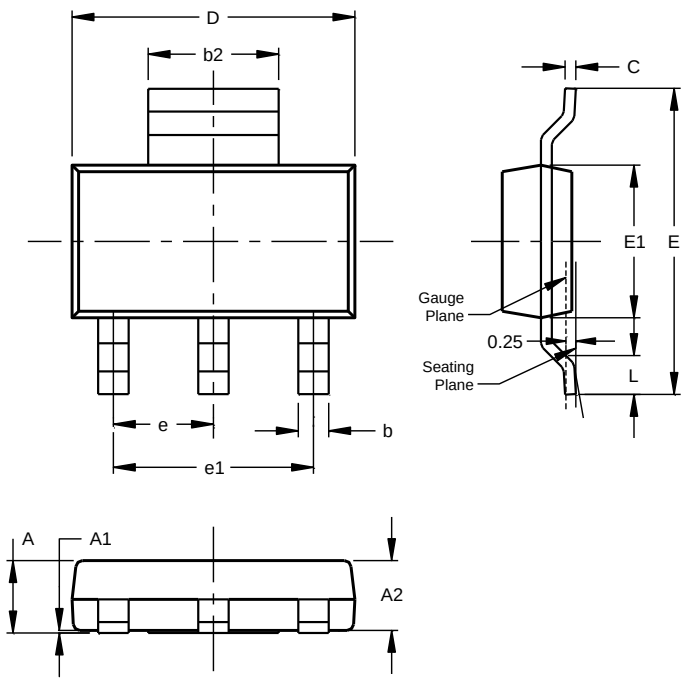

Figure 13. Transient Thermal Resistance


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## Package Outline Dimensions

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

**SOT223 (Type DN)**

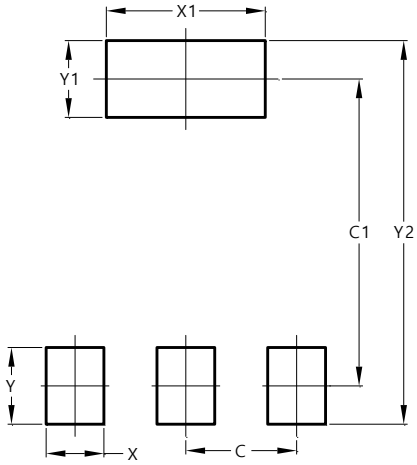



| SOT223 (Type DN) | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | -- | 1.70 | -- |
| **A1** | 0.01 | 0.15 | -- |
| **A2** | 1.50 | 1.68 | 1.60 |
| **b** | 0.60 | 0.80 | 0.70 |
| **b2** | 2.90 | 3.10 | -- |
| **c** | 0.20 | 0.32 | -- |
| **D** | 6.30 | 6.70 | -- |
| **E** | 6.70 | 7.30 | -- |
| **E1** | 3.30 | 3.70 | -- |
| **e** | -- | -- | 2.30 |
| **e1** | -- | -- | 4.60 |
| **L** | 0.85 | -- | -- |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**SOT223 (Type DN)**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 2.30 |
| **C1** | 6.40 |
| **X** | 1.20 |
| **X1** | 3.30 |
| **Y** | 1.60 |
| **Y1** | 1.60 |
| **Y2** | 8.00 |


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