# 100V N-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $BV_{DSS}$ | $R_{DS(on)}$ max | $I_D$ max $T_A$ = 25°C |
|---|---|---|
| 100V | 3.0Ω @ $V_{GS}$ = 10V | 0.6A |
| | 4.5Ω @ $V_{GS}$ = 5.0V | 0.5A |

## Description and Applications

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

- DC-DC converters
- Power management functions

## Features and Benefits

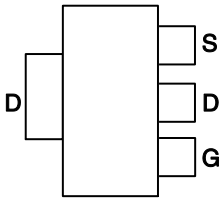
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

## Mechanical Data

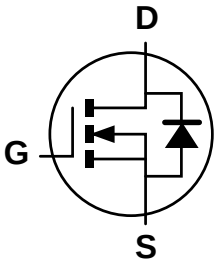
- Package: SOT223 (Type DN)
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.112 grams (Approximate)

SOT223 (Type DN)

Top View




Pin Out - Top View



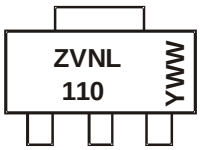

Equivalent Circuit

## Ordering Information (Note 4)

| Part Number | Package | Packing | |
|---|---|---|---|
| | | Qty. | Carrier |
| ZVNL110GTA | 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




ZVNL110 = Product Type Marking Code
YWW = Date Code Marking
Y or $\overline{Y}$ = Last Digit of Year (ex: 2= 2022)
WW or $\overline{WW}$ = Week Code (01~53)

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

| Characteristic | | | Symbol | Value | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 100 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current (Note 6) $V_{GS}$ = 10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 0.6<br>0.5 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle ≦ 1%) | | | $I_{DM}$ | 6 | A |
| Maximum Body Diode Continuous Current (Note 6) | | | $I_S$ | 0.6 | A |

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

| Characteristic | | Symbol | Value | Units |
|---|---|---|---|---|
| Total Power Dissipation | (Note 5) | $P_D$ | 1.1 | W |
| | (Note 6) | | 2.0 | |
| Thermal Resistance, Junction to Ambient | (Note 5) | $R_{\theta JA}$ | 113 | °C/W |
| | (Note 6) | | 61 | |
| Thermal Resistance, Junction to Case | (Note 6) | $R_{\theta JC}$ | 6.6 | |
| 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, $I_D$ = 1mA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 10<br>100 | µA | $V_{DS}$ = 100V, $V_{GS}$ = 0V<br>$V_{DS}$ = 80V, $V_{GS}$ = 0V, $T_J$ = +125°C |
| Gate-Body Leakage | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| On-State Drain Current | $I_{D(on)}$ | 750 | — | — | mA | $V_{DS}$ = 25V, $V_{GS}$ = 5V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.75 | — | 1.5 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 1mA |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | — | — | 3.0 | Ω | $V_{GS}$ = 10V, $I_D$ = 500mA |
| | | — | — | 4.5 | | $V_{GS}$ = 5.0V, $I_D$ = 250mA |
| Forward Transconductance | $g_{fs}$ | 225 | — | — | mS | $V_{DS}$ = 25V, $I_D$ = 500mA |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 47 | 75 | pF | $V_{DS}$ = 25V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 23 | 25 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 6 | 8 | | |
| Turn-On Delay Time | $t_{D(on)}$ | — | 2 | 7 | ns | $V_{DD}$ = 25V, $V_{GS}$ = 10V,<br>$R_G$ = 6.0Ω, $I_D$ = 1.0A |
| Turn-On Rise Time | $t_R$ | — | 3 | 12 | | |
| Turn-Off Delay Time | $t_{D(off)}$ | — | 5 | 15 | | |
| Turn-Off Fall Time | $t_F$ | — | 2 | 13 | | |

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 1inch square copper plate.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

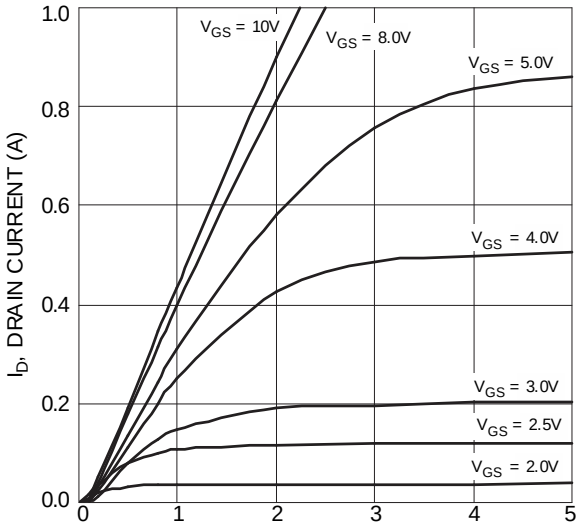


Figure 1 Typical Output Characteristics

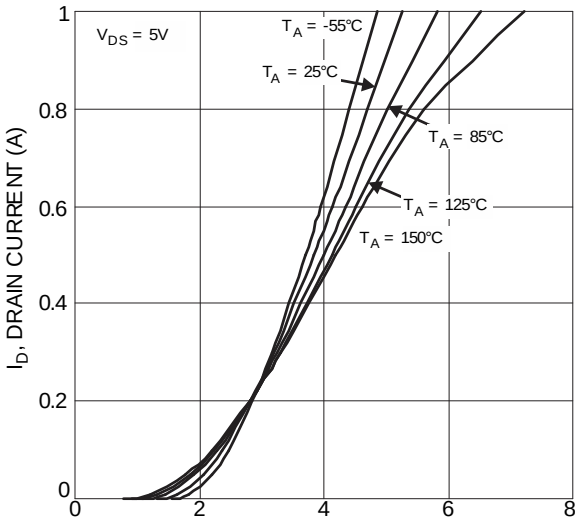


Figure 2 Typical Transfer Characteristics

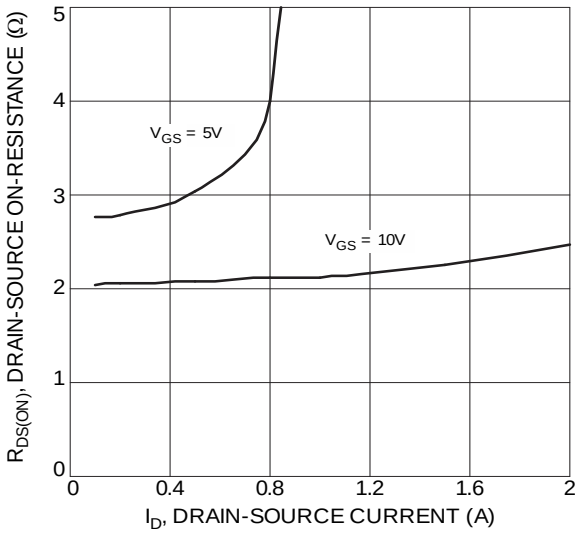


Figure 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

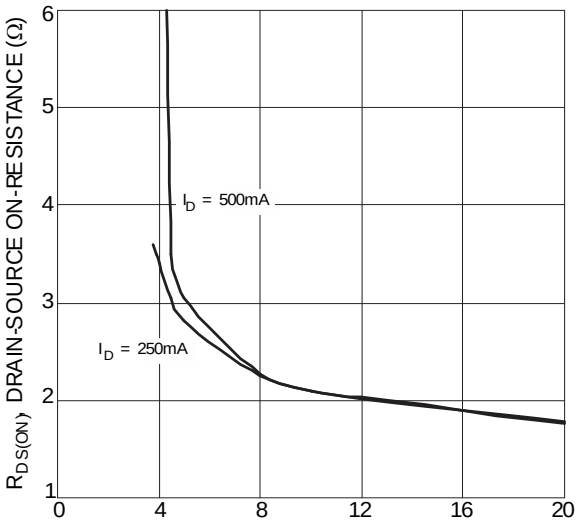


Figure 4 Typical Transfer Characteristics

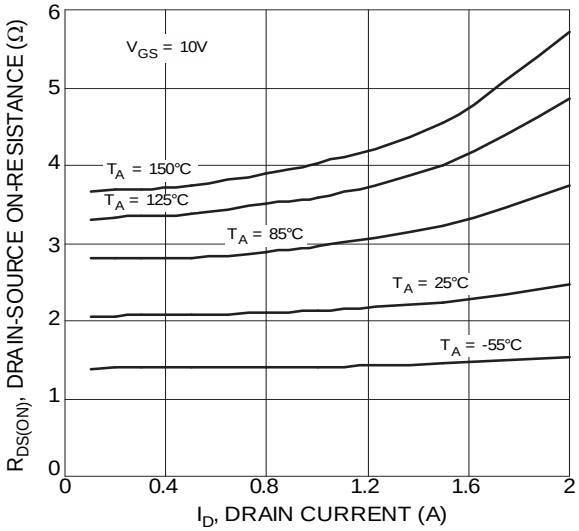


Figure 5 Typical On-Resistance vs.
Drain Current and Temperature

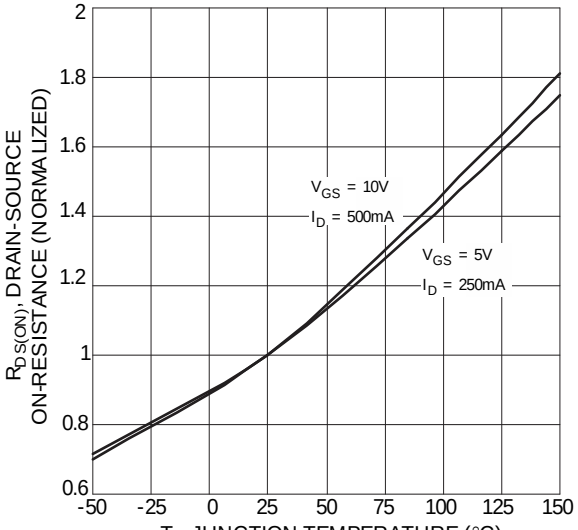


Figure 6 On-Resistance Variation with Temperature

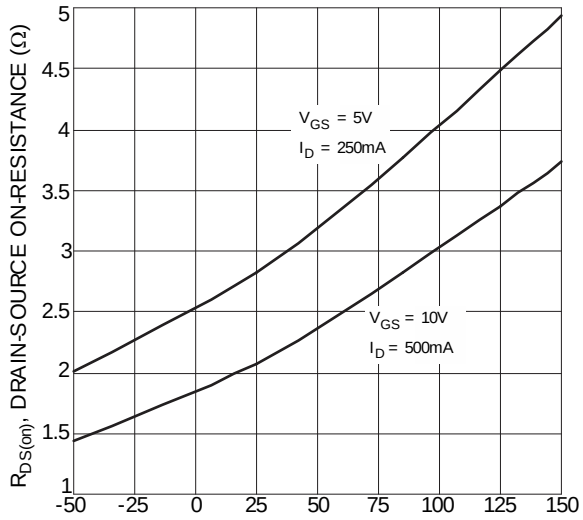


Figure 7 On-Resistance Variation with Temperature

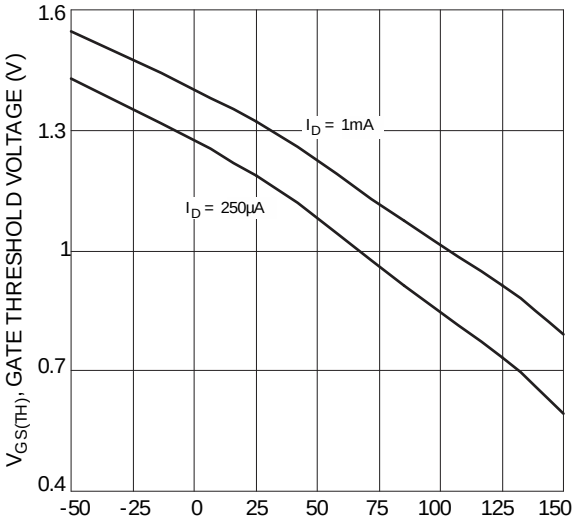


Figure 8 Gate Threshold Variation vs. Temperature

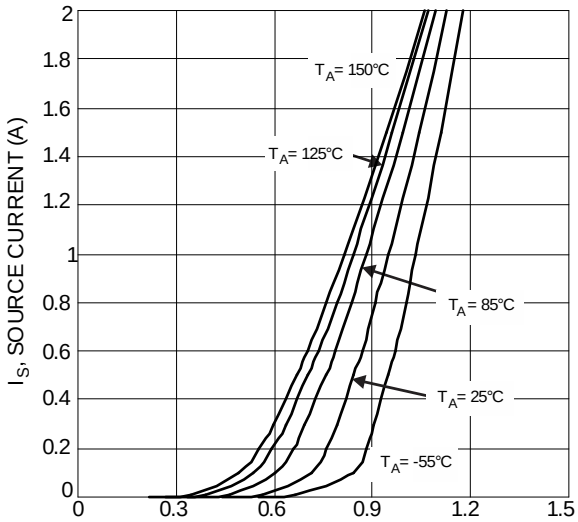


Figure 9 Diode Forward Voltage vs. Current

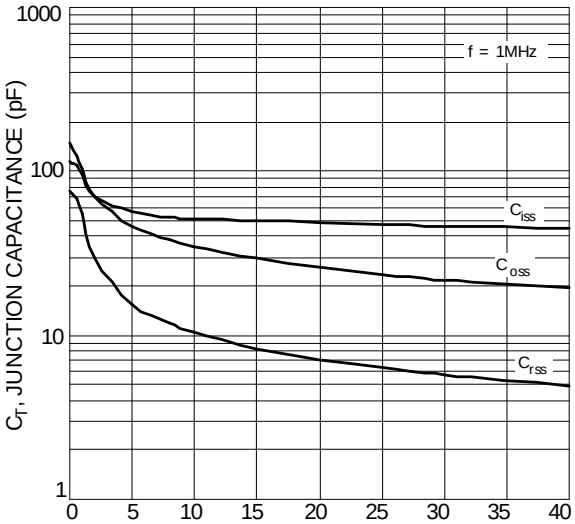


Figure 10 Typical Junction Capacitance

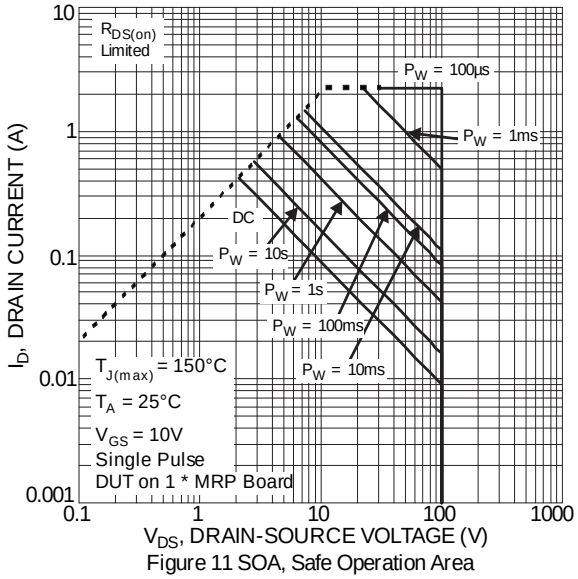


Figure 11 SOA, Safe Operation Area

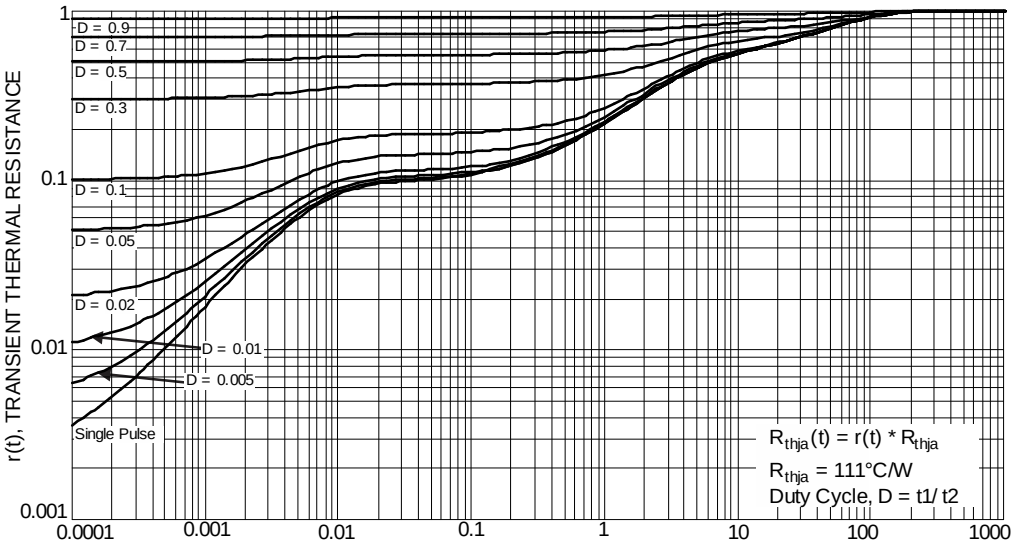
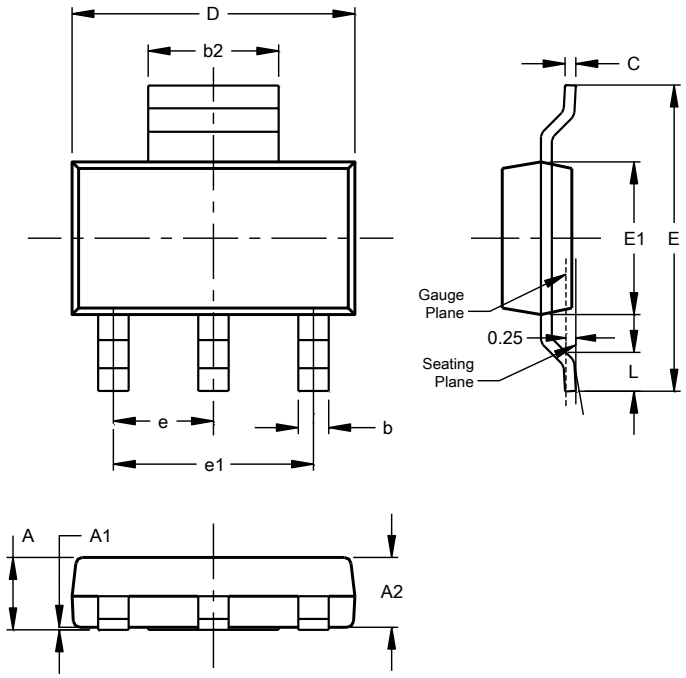



Figure 12 Transient Thermal Resistance

## Package Outline Dimensions

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

**SOT223 (Type DN)**

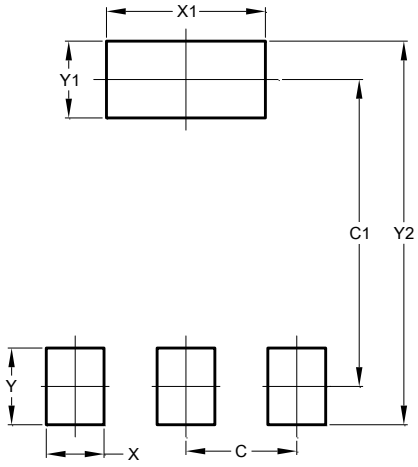



| SOT223 (Type DN) | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | -- | 1.70 | -- |
| **A1** | 0.01 | 0.15 | -- |
| **A2** | 1.50 | 1.68 | 1.60 |
| **b** | 0.60 | 0.80 | 0.70 |
| **b2** | 2.90 | 3.10 | -- |
| **c** | 0.20 | 0.32 | -- |
| **D** | 6.30 | 6.70 | -- |
| **E** | 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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