

## Product Summary

| $BV_{DSS}$ | $R_{DS(on)}$                            | $I_D$<br>$T_A = +25^\circ\text{C}$ |
|------------|---|------------------------------------|
| -60V       | 125m $\Omega$ @ $V_{GS} = -10\text{V}$  | -4.3A                              |
|            | 190m $\Omega$ @ $V_{GS} = -4.5\text{V}$ | -3.5A                              |

## Features and Benefits

- $V_{(BR)DSS} > 100\text{V}$
- $R_{DS(on)} \leq 0.54\Omega$  @  $V_{GS} = 10\text{V}$
- Maximum Continuous Drain Current  $I_D = 1.67\text{A}$
- 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 refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.**
- 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 (ZEMP6A17GQ)**

## Description and Applications

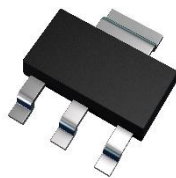
This MOSFET is designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- DC-DC converters
- Solenoids/relay driver for automotive applications

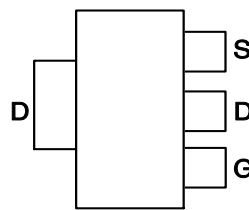
## Mechanical Data

- Package: SOT223 (Type DN)
- Package Material: Molded Plastic, 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
- Weight: 0.112 grams (Approximate)

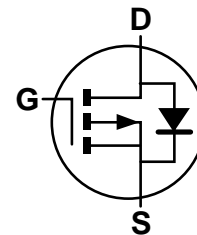
SOT223 (Type DN)



Top View



Pin Out - Top View



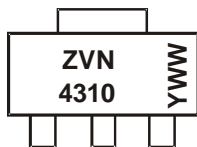
Equivalent Circuit

## Ordering Information (Note 4)

| Part Number | Package          | Packing |             |
|-------------|------------------|---------|-------------|
|             |                  | Qty.    | Carrier     |
| ZVN4310GTA  | SOT223 (Type DN) | 1,000   | Tape & Reel |

- Notes:
- EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  - 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.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>

## Marking Information



ZVN4310 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 1= 2021)  
 WW or  $\bar{W}W$  = Week Code (01~53)

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

| Characteristic                | Symbol    | Value    | Unit |
|-------------------------------|-----------|----------|------|
| Drain-Source Voltage          | $V_{DSS}$ | 100      | V    |
| Gate-Source Voltage           | $V_{GSS}$ | $\pm 20$ | V    |
| Continuous Drain Current      | $I_D$     | 1.67     | A    |
| Pulsed Drain Current (Note 6) | $I_{DM}$  | 12       | A    |

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

| Characteristic                                   | Symbol          | Value       | Unit               |
|--|-----------------|-------------|--------------------|
| Power Dissipation (Note 5)                       | $P_D$           | 3           | W                  |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 41.7        | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Leads (Note 7)   | $R_{\theta JL}$ | 8.84        | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$  | -55 to +150 | $^\circ\text{C}$   |

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

| Characteristic  | Symbol       | Min | Typ        | Max          | Unit                           | Test Condition  |
|---|--------------|-----|------------|--------------|--------------------------------|---|
| <b>OFF CHARACTERISTICS (Note 8)</b>                       |              |     |            |              |                                |   |
| Drain-Source Breakdown Voltage                            | $BV_{DSS}$   | 100 | -          | -            | V                              | $V_{GS} = 0V, I_D = 1mA$  |
| Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$ | $I_{DSS}$    | -   | -          | 10<br>100    | $\mu\text{A}$<br>$\mu\text{A}$ | $V_{DS} = 100V, V_{GS} = 0V$<br>$V_{DS} = 80V, V_{GS} = 0V, T_A = +125^\circ\text{C}$ |
| Gate-Source Leakage                                       | $I_{GSS}$    | -   | -          | $\pm 20$     | nA                             | $V_{GS} = \pm 20V, V_{DS} = 0V$   |
| On-State Drain Current                                    | $I_{D(on)}$  | 9   | -          | -            | A                              | $V_{GS} = 10V, V_{DS} = 10V$  |
| <b>ON CHARACTERISTICS (Note 8)</b>                        |              |     |            |              |                                |   |
| Gate Threshold Voltage                                    | $V_{GS(th)}$ | 1   | -          | 3            | V                              | $V_{DS} = V_{GS}, I_D = 1mA$  |
| Static Drain-Source On-Resistance                         | $R_{DS(on)}$ | -   | 0.4<br>0.5 | 0.54<br>0.75 | $\Omega$                       | $V_{GS} = 10V, I_D = 3.3A$<br>$V_{GS} = 5V, I_D = 1.5A$                               |
| Forward Transconductance                                  | $g_{fs}$     | 0.6 | -          | -            | S                              | $V_{DS} = 10V, I_D = 3.3A$  |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>                   |              |     |            |              |                                |   |
| Input Capacitance   | $C_{iss}$    | -   | -          | 350          | pF                             | $V_{DS} = 25V, V_{GS} = 0V,$<br>$f = 1.0MHz$  |
| Output Capacitance  | $C_{oss}$    | -   | -          | 140          | pF                             |   |
| Reverse Transfer Capacitance                              | $C_{rss}$    | -   | -          | 20           | pF                             |   |
| Turn-On Delay Time  | $t_{D(on)}$  | -   | -          | 8            | ns                             | $V_{DD} = 25V, I_D = 3A, V_{GEN} = 10V,$<br>$R_{GS} = 50\Omega$                       |
| Turn-On Rise Time   | $t_R$        | -   | -          | 25           | ns                             |   |
| Turn-Off Delay Time                                       | $t_{D(off)}$ | -   | -          | 30           | ns                             |   |
| Turn-Off Fall Time  | $t_F$        | -   | -          | 16           | ns                             |   |

- Notes:
- For a device mounted on 50mm X 50mm X 1.6mm FR-4 PCB with high coverage of single sided 2oz copper, in still air condition.
  - Device mounted on minimum recommended pad layout test board, 10 $\mu\text{s}$  pulse duty cycle = 1%.
  - Thermal resistance from junction to solder-point (at the end of the drain lead).
  - Short duration pulse test used to minimize self-heating effect.

**Electrical Characteristics**

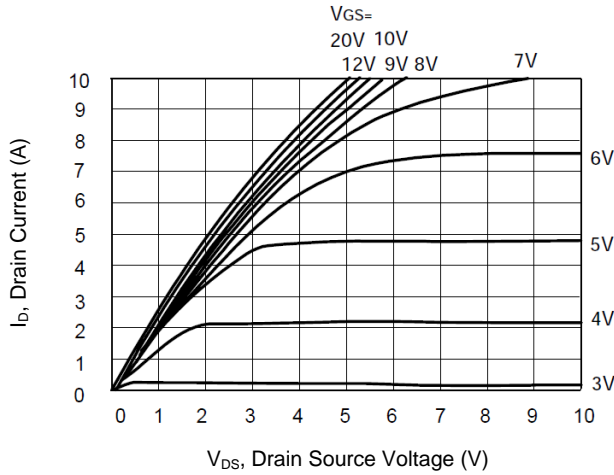


Figure 1. Saturation Characteristics

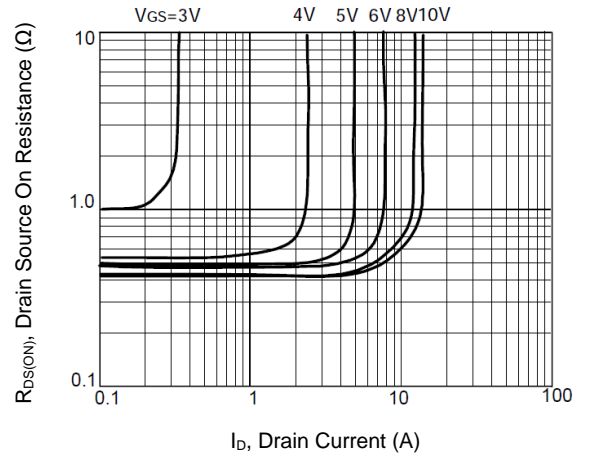


Figure 2. On-resistance vs. Drain Current

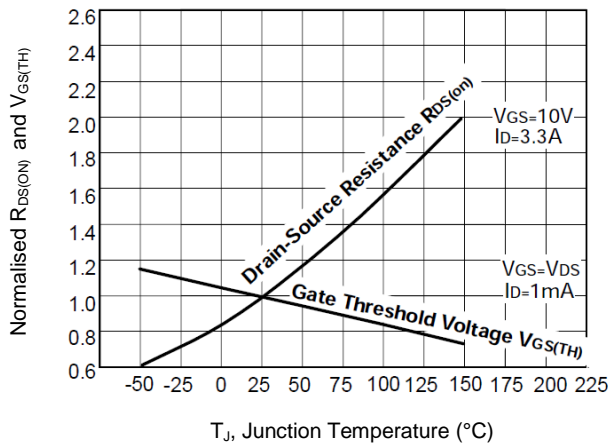


Figure 3. Normalised  $R_{DS(ON)}$  and  $V_{GS(TH)}$  vs. Temperature

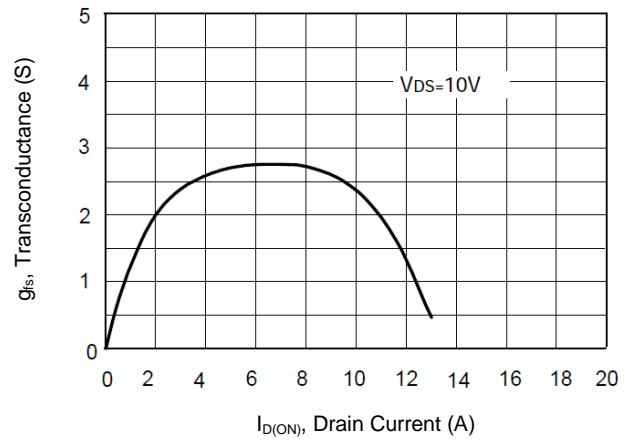


Figure 4. Transconductance vs. Drain Current

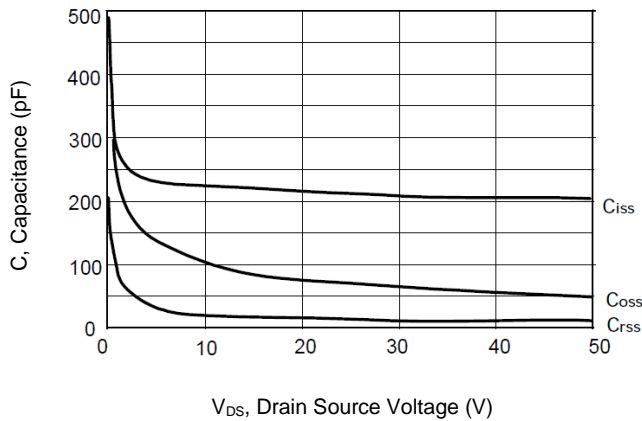


Figure 5. Capacitance vs. Drain-source Voltage

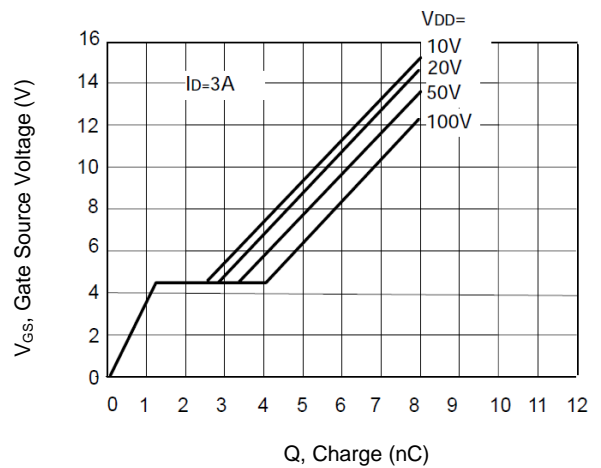
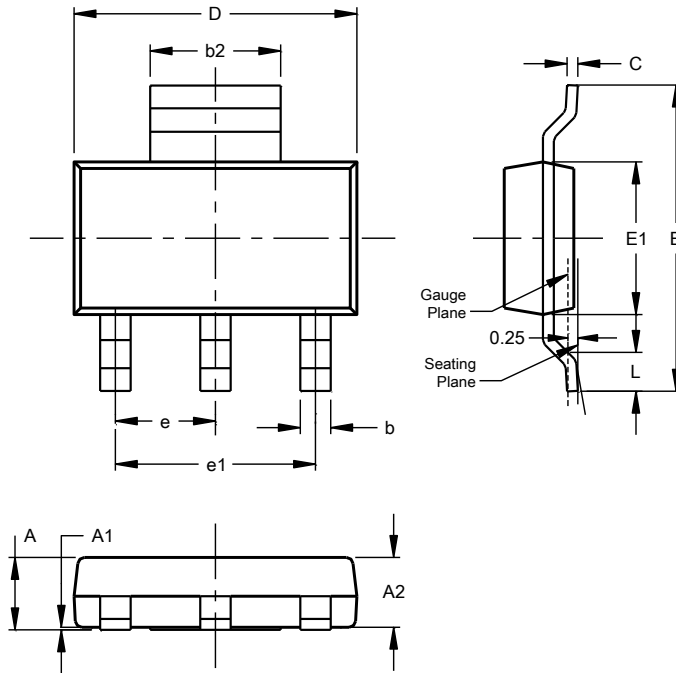


Figure 6. Gate Charge vs. Gate-source Voltage

## Package Outline Dimensions

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

### SOT223 (Type DN)

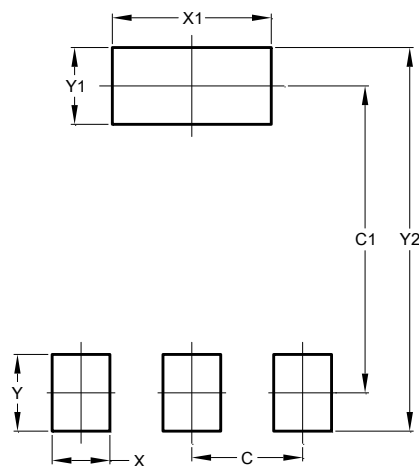


| SOT223 (Type DN)     |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | --   | 1.70 | --   |
| A1                   | 0.01 | 0.15 | --   |
| A2                   | 1.50 | 1.68 | 1.60 |
| b                    | 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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