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## Product Summary

|               |                             |                                    |
|---------------|-----------------------------|------------------------------------|
| $V_{(BR)DSS}$ | $R_{DS(ON)}$                | $I_D$<br>$T_A = +25^\circ\text{C}$ |
| 200V          | 10Ω @ $V_{GS} = 10\text{V}$ | 320mA                              |

## Description

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.

## Applications

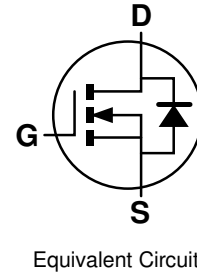
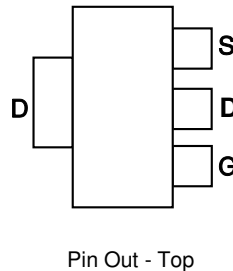
- Off-line Power Supply Start-up Circuitry

## 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)**
- Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

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

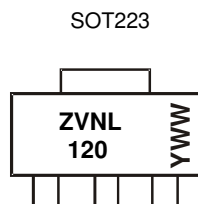


## Ordering Information (Note 4)

| Part Number | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|---------|--------------------|-----------------|-------------------|
| ZVNL120GTA  | ZVNL120 | 7                  | 12              | 1,000             |
| ZVNL120GTC  | ZVNL120 | 13                 | 12              | 4,000             |

- Notes:
- EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  - See [http://www.diodes.com/quality/lead\\_free.html](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.
  - 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 <http://www.diodes.com/products/packages.html>.

## Marking Information



ZVNL120 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 5 = 2015)  
 WW or  $\bar{W}W$  = Week Code (01~53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic   | Symbol           | Value | Unit |
|--|------------------|-------|------|
| Drain-Source Voltage   | V <sub>DSS</sub> | 200   | V    |
| Gate-Source Voltage  | V <sub>GSS</sub> | ±20   | V    |
| Continuous Drain Current (V <sub>GS</sub> = 10V, T <sub>A</sub> = +25°C) | I <sub>D</sub>   | 320   | mA   |
| Pulsed Drain Current   | I <sub>DM</sub>  | 2     | A    |

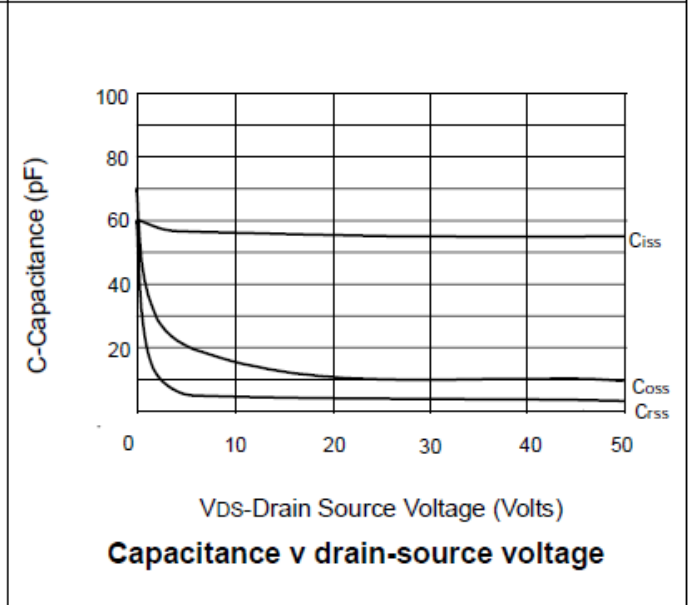
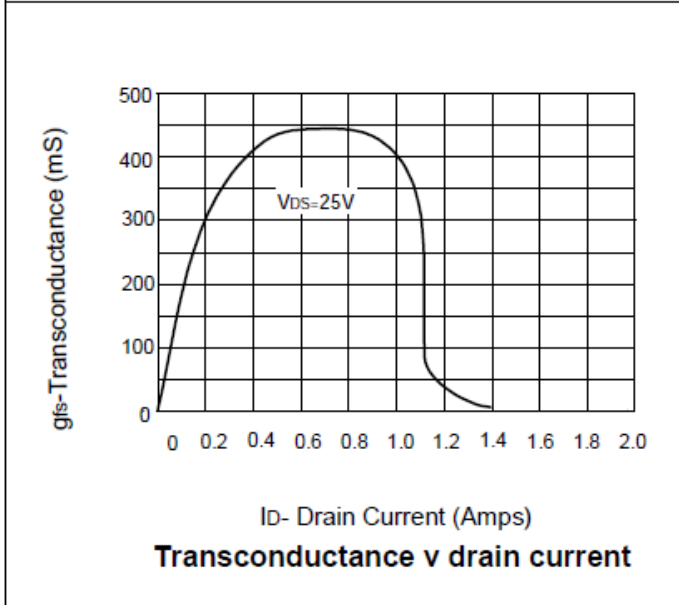
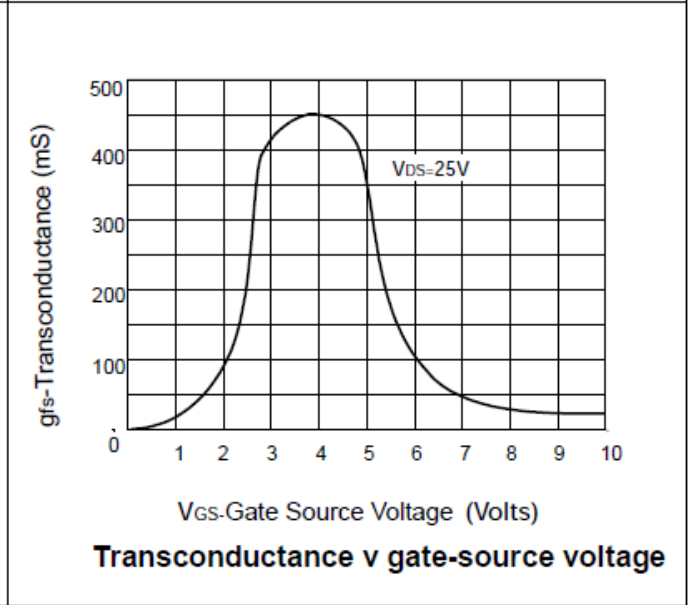
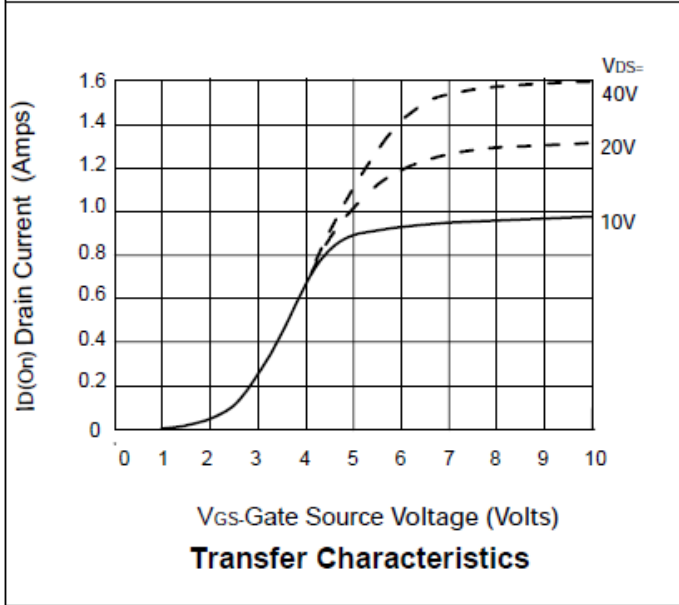
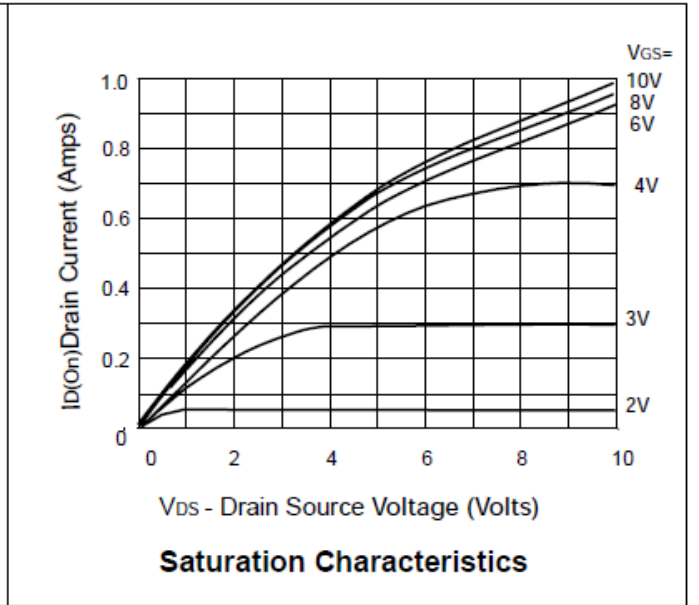
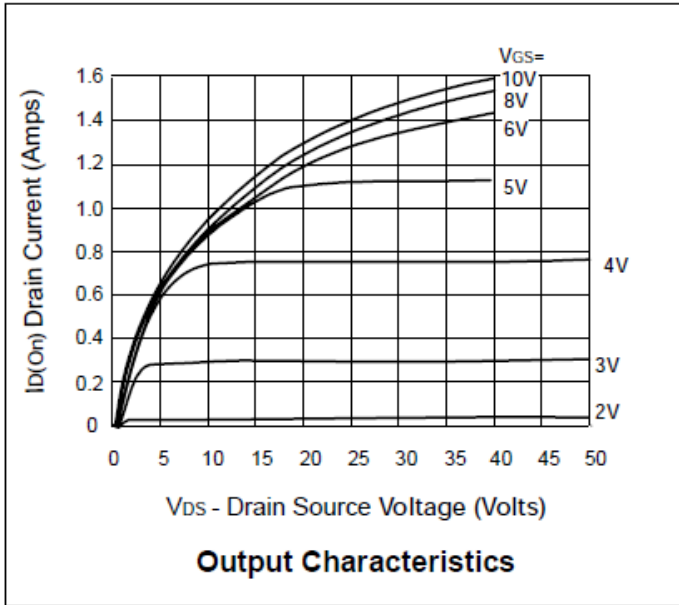
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

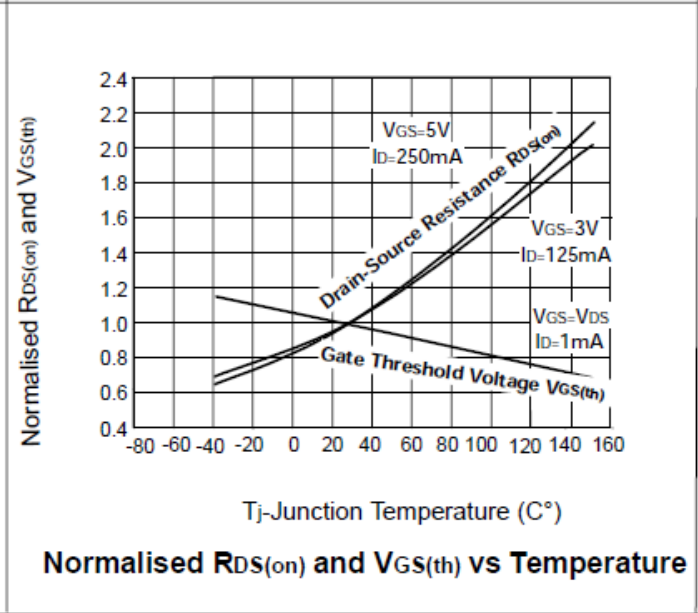
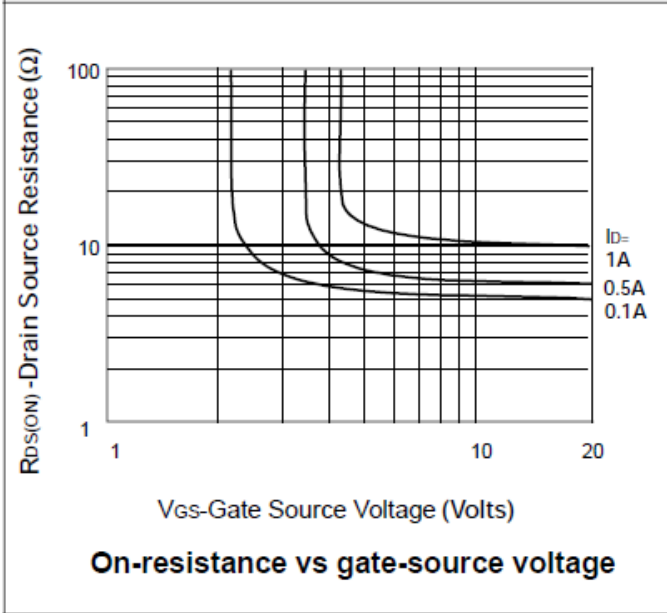
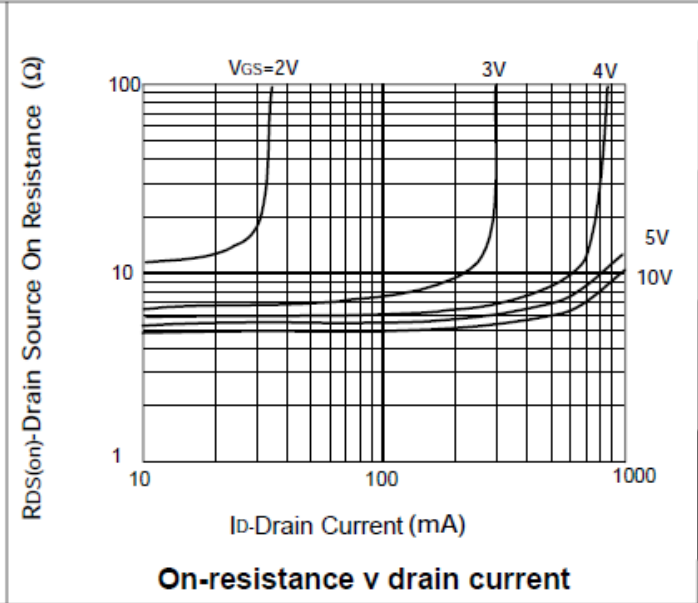
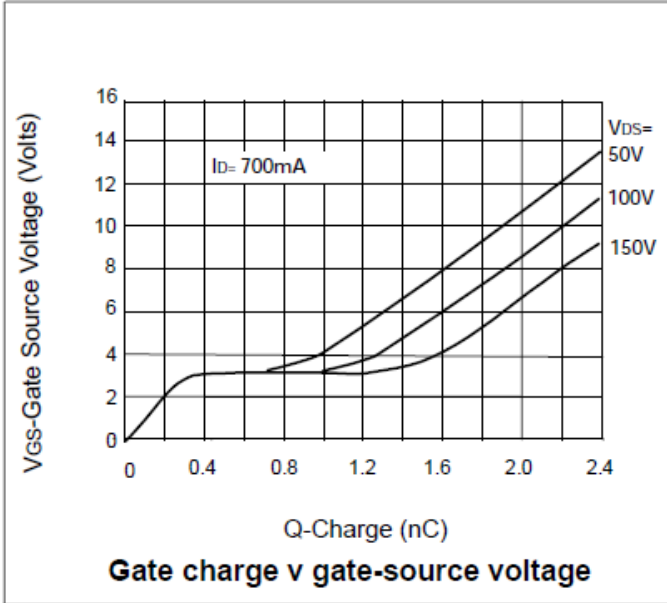
| Characteristic                                       | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation at T <sub>A</sub> = +25°C (Note 5) | P <sub>D</sub>                    | 2.0         | W    |
| Operating and Storage Temperature Range              | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                             | Symbol              | Min | Typ | Max       | Unit | Test Condition   |
|--|---------------------|-----|-----|-----------|------|--|
| <b>OFF CHARACTERISTICS</b>                 |                     |     |     |           |      |  |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 200 | -   | -         | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA   |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | -   | -   | 10<br>100 | μA   | V <sub>DS</sub> = 200V, V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = 160V, V <sub>GS</sub> = 0V, T = +125°C |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | -   | -   | 100       | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS</b>                  |                     |     |     |           |      |  |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 0.5 | -   | 1.5       | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1mA   |
| Static Drain-Source On-Resistance (Note 6) | R <sub>DS(ON)</sub> | -   | -   | 10        | Ω    | V <sub>GS</sub> = 5V, I <sub>D</sub> = 250mA   |
|  |                     | -   | -   | 10        | Ω    | V <sub>GS</sub> = 3V, I <sub>D</sub> = 125mA   |
| Forward Transconductance (Notes 6 & 7)     | g <sub>fs</sub>     | 200 | -   | -         | mS   | V <sub>DS</sub> = 25V, I <sub>D</sub> = 250mA  |
| On-State Drain Current (Note 6)            | I <sub>D(ON)</sub>  | 500 | -   | -         | mA   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 5V  |
| <b>DYNAMIC CHARACTERISTICS (Note 7)</b>    |                     |     |     |           |      |  |
| Input Capacitance                          | C <sub>iss</sub>    | -   | -   | 85        | pF   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz   |
| Output Capacitance                         | C <sub>oss</sub>    | -   | -   | 20        | pF   |  |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | -   | -   | 7         | pF   |  |
| Turn-On Delay Time (Note 8)                | t <sub>D(ON)</sub>  | -   | -   | 8         | ns   | V <sub>DD</sub> = 25V, I <sub>D</sub> = 250mA  |
| Turn-On Rise Time (Note 8)                 | t <sub>R</sub>      | -   | -   | 8         | ns   |  |
| Turn-Off Delay Time (Note 8)               | t <sub>D(OFF)</sub> | -   | -   | 20        | ns   |  |
| Turn-Off Fall Time (Note 8)                | t <sub>F</sub>      | -   | -   | 12        | ns   |  |

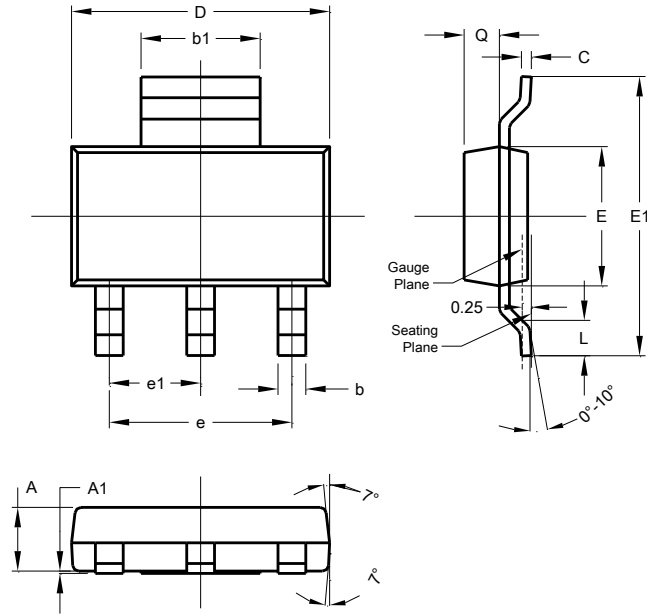
- Notes:
5. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  6. Measured under pulsed conditions. Pulse width ≅ 300μs. Duty cycle ≅ 2%.
  7. Sample test.
  8. Switching times measured with 50Ω source impedance and <5ns rise time on a pulse generator.





**Package Outline Dimensions**

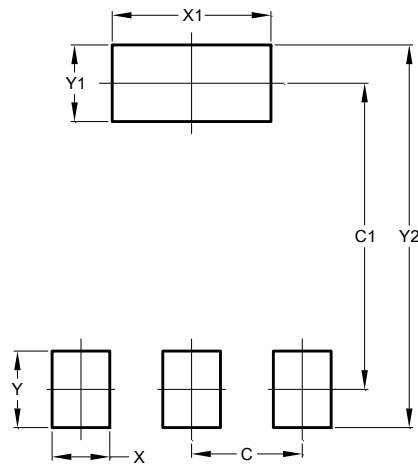
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT223               |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A                    | 1.55  | 1.65 | 1.60 |
| A1                   | 0.010 | 0.15 | 0.05 |
| b                    | 0.60  | 0.80 | 0.70 |
| b1                   | 2.90  | 3.10 | 3.00 |
| C                    | 0.20  | 0.30 | 0.25 |
| D                    | 6.45  | 6.55 | 6.50 |
| E                    | 3.45  | 3.55 | 3.50 |
| E1                   | 6.90  | 7.10 | 7.00 |
| e                    | -     | -    | 4.60 |
| e1                   | -     | -    | 2.30 |
| L                    | 0.85  | 1.05 | 0.95 |
| Q                    | 0.84  | 0.94 | 0.89 |
| All Dimensions in mm |       |      |      |

**Suggested Pad Layout**

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



| 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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