

**200V N-CHANNEL ENHANCEMENT MODE VERTICAL MOSFET IN SOT223**
**Product Summary**

<b>BV<sub>DSS</sub></b>	<b>R<sub>DS(on)</sub></b>	<b>I<sub>D</sub></b> <b>T<sub>A</sub> = +25°C</b>
200V	10Ω @ V <sub>GS</sub> = 10V	0.32A

**Features and Benefits**

- V<sub>(BR)DSS</sub> > 200V
- R<sub>DS(on)</sub> ≤ 10 Ω @ V<sub>GS</sub> = 10V
- **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](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

**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
- Automotive Solenoids / Relay Drivers

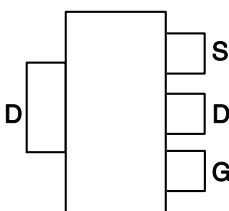
**Mechanical Data**

- 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 Ⓔ3
- Weight: 0.112 grams (Approximate)

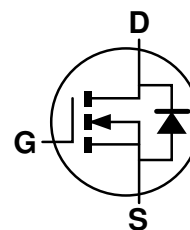
SOT223 (Type DN)



Top View



Pin Out - Top

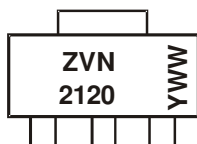


Equivalent Circuit

**Ordering Information (Note 4)**

Part Number	Package	Packing	
		Qty.	Carrier
ZVN2120GTA	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**


ZVN2120 = 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.)

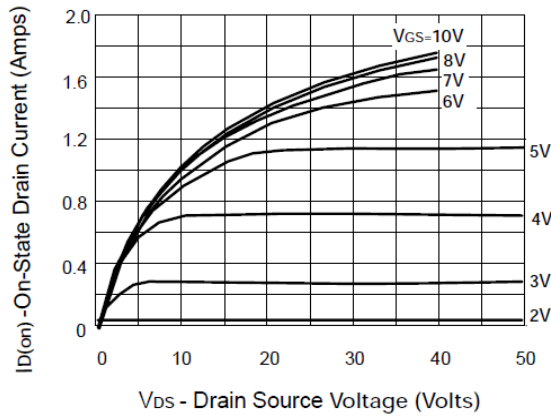
Characteristic	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	200	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	0.32	A
Pulsed Drain Current	$I_{DM}$	2	A
Power Dissipation	$P_D$	2	W
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

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

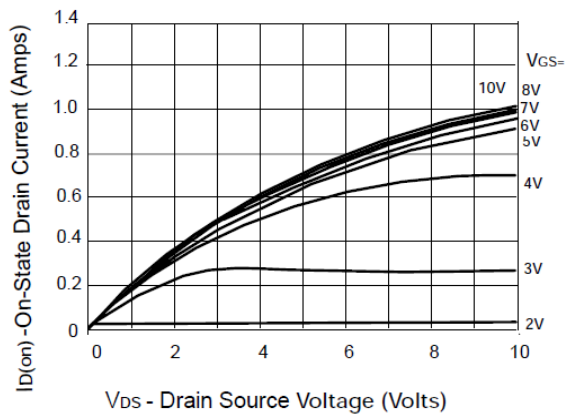
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 5)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	200	-	-	V	$V_{GS} = 0V, I_D = 1mA$
Zero Gate Voltage Drain Current	$I_{DSS}$	-	-	10 100	$\mu\text{A}$ $\mu\text{A}$	$V_{DS} = 200V, V_{GS} = 0V$ $V_{DS} = 160V, V_{GS} = 0V, T_J = +125^\circ\text{C}$ (Note 7)
Gate-Source Leakage	$I_{GSS}$	-	-	$\pm 20$	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
On-State Drain Current (Note 6)	$I_{D(on)}$	500	-	-	mA	$V_{GS} = 10V, V_{DS} = 25V$
<b>ON CHARACTERISTICS (Note 5)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	1	-	3	V	$V_{DS} = V_{GS}, I_D = 1mA$
Static Drain-Source On-Resistance (Note 6)	$R_{DS(on)}$	-	-	10	$\Omega$	$V_{GS} = 10V, I_D = 250mA$
Forward Transconductance (Notes 6, 7)	$g_{fs}$	100	-	-	mS	$V_{DS} = 25V, I_D = 250mA$
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	$C_{iss}$	-	-	85	pF	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$
Output Capacitance	$C_{oss}$	-	-	20	pF	
Reverse Transfer Capacitance	$C_{rss}$	-	-	7	pF	
Turn-On Delay Time (Note 8)	$t_{D(on)}$	-	-	8	ns	$V_{DD} = 25V, I_D = 250mA$
Turn-On Rise Time (Note 8)	$t_R$	-	-	8	ns	
Turn-Off Delay Time (Note 8)	$t_{D(off)}$	-	-	20	ns	
Turn-Off Fall Time (Note 8)	$t_F$	-	-	12	ns	

- Notes:
5. Short duration pulse test used to minimize self-heating effect.
  6. Measured under pulsed conditions. Width=300ms. Duty cycle  $\leq 2\%$ .
  7. Guaranteed by design. Not subject to product testing.
  8. Switching times measured with  $50\Omega$  source impedance and  $< 5ns$  rise time on a pulse generator.

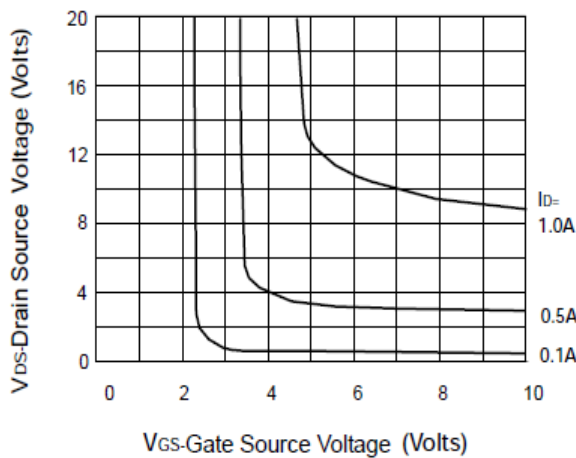
**TYPICAL CHARACTERISTICS**



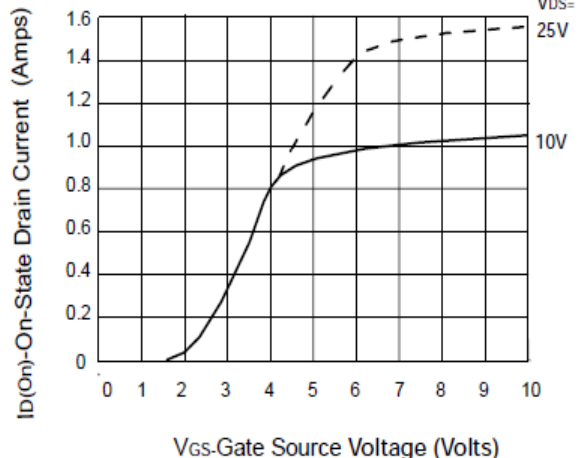
**Output Characteristics**



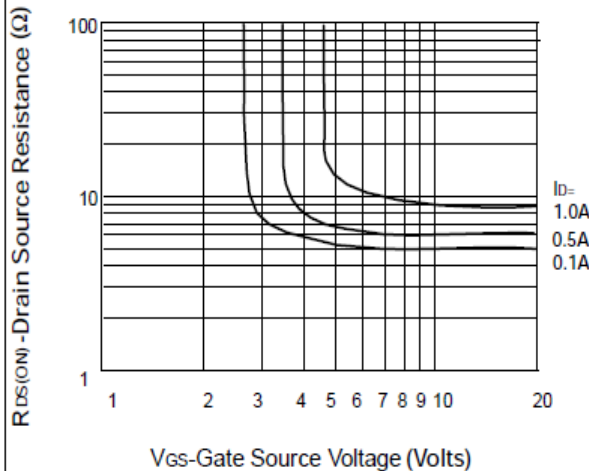
**Saturation Characteristics**



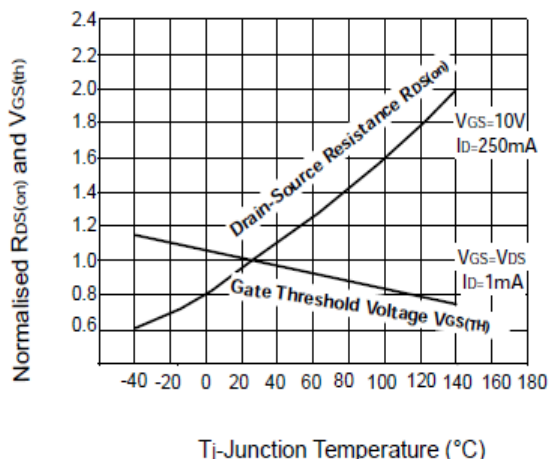
**Voltage Saturation Characteristics**



**Transfer Characteristics**

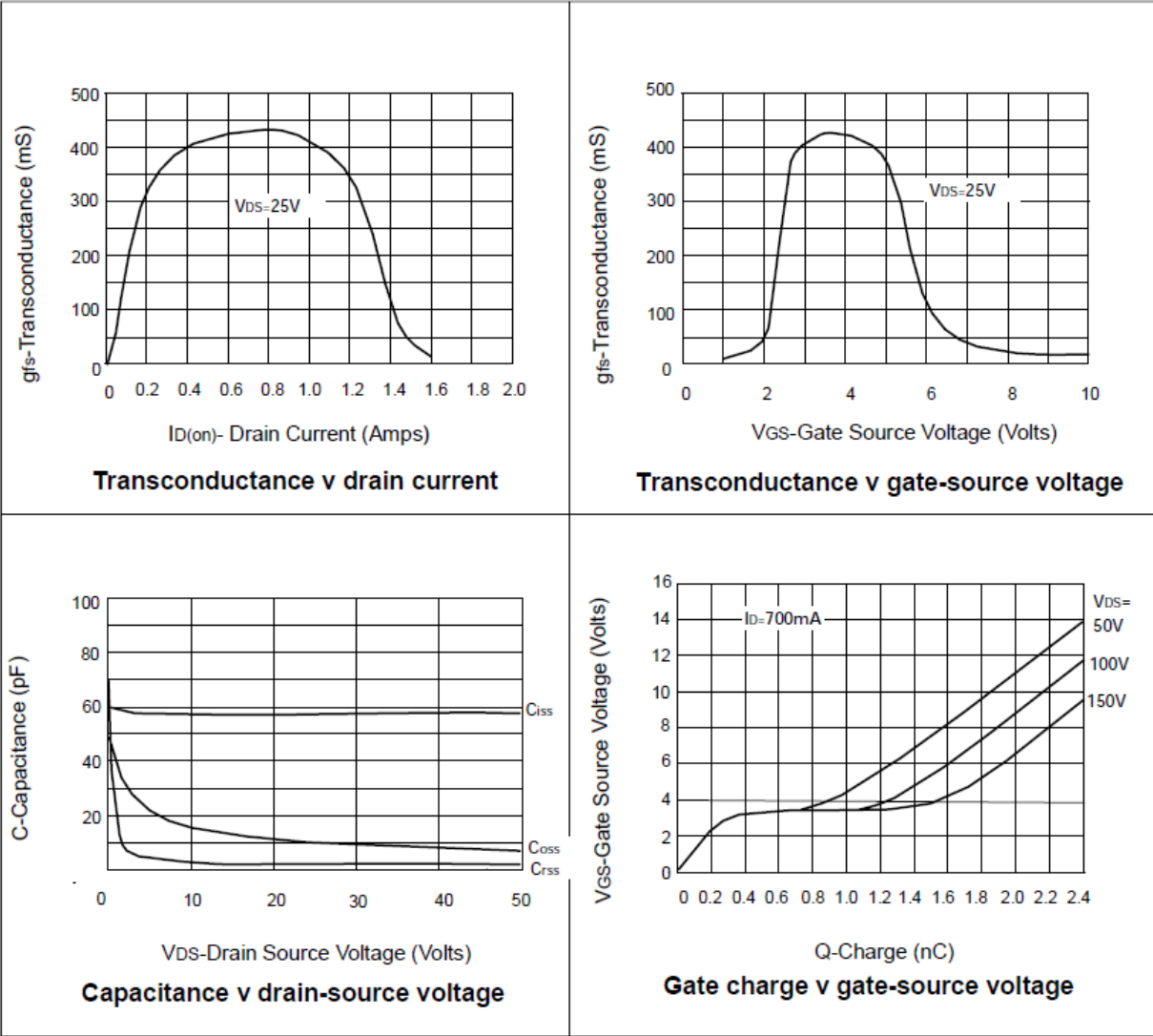


**On-resistance vs gate-source voltage**



**Normalised  $R_{DS(on)}$  and  $V_{GS(th)}$  v Temperature**

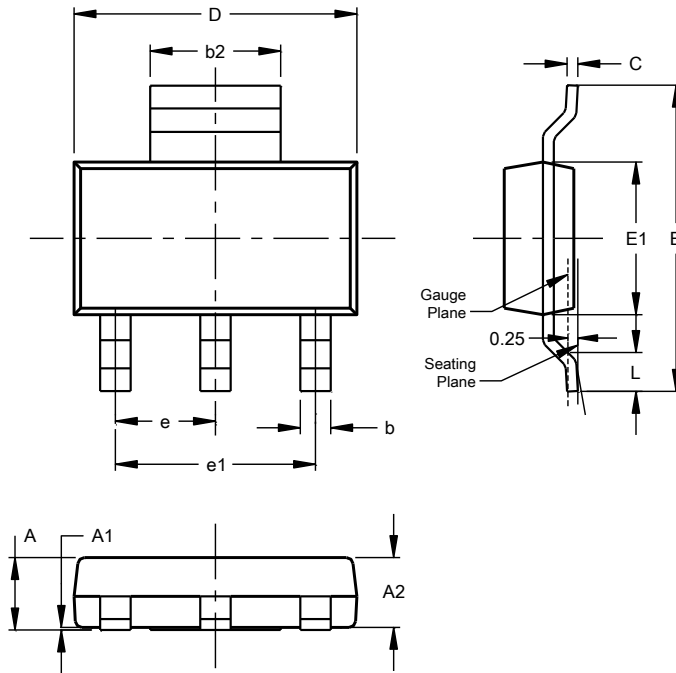
**TYPICAL CHARACTERISTICS**



## Package Outline Dimensions

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

SOT223 (Type DN)

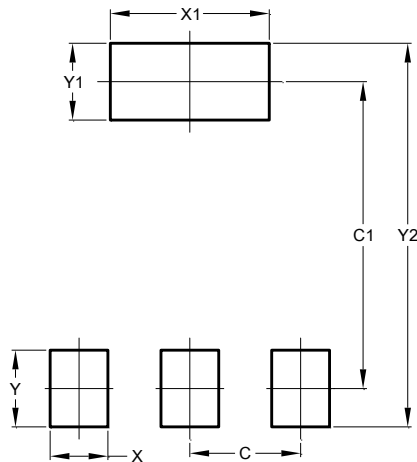


SOT223 (Type DN)			
Dim	Min	Max	Typ
A	--	1.70	--
A1	0.01	0.15	--
A2	1.50	1.68	1.60
b	0.60	0.80	0.70
b2	2.90	3.10	--
c	0.20	0.32	--
D	6.30	6.70	--
E	6.70	7.30	--
E1	3.30	3.70	--
e	--	--	2.30
e1	--	--	4.60
L	0.85	--	--
All Dimensions in mm			

## 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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