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Lead-free Green

VN10LP

60V N-CHANNEL ENHANCEMENT MODE VERTICAL DMOSFET

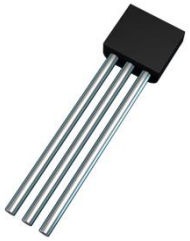
Features

- BV_{DSS} > 60V
- $R_{DS(ON)}$ ≤ 5Ω @ V_{GS} = 10V
- I_D = 270mA Maximum Continuous Drain Current
- **Totally Lead-Free & Fully 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-Q100/101/104/200, 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/**

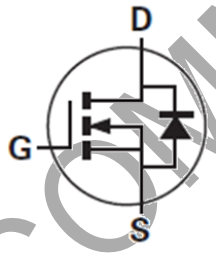
Mechanical Data

- Package: E-Line (TO-92 Compatible)
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Rating 94V-0
- Terminals: Finish - Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.159 grams (Approximate)

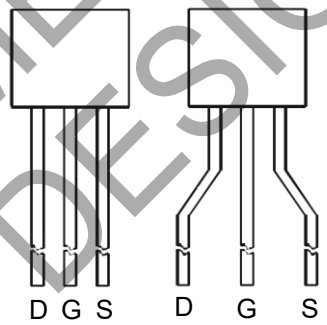
E-Line
(TO-92 Compatible)



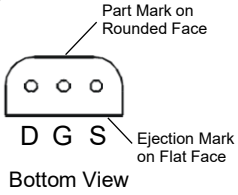
Flat Face View



Device Symbol



Rounded Face View



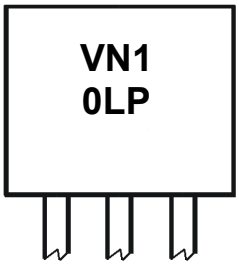
Bottom View

Ordering Information (Note 4)

Orderable Part Number	Marking	Package	Leads	Packing	
				Qty.	Carrier
VN10LP	VN10LP	E-Line	Straight	4,000	Loose in a Box
VN10LPSTZ	VN10LP	E-Line	Joggled	2,000	Taped per Ammo Box

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
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



Rounded Face View

VN10LP = Product Type Marking Code

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	60	V
Gate-Source Voltage	V_{GSS}	±20	V
Continuous Drain Current	I_D	270	mA
Pulsed Drain Current	I_{DM}	3	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	625	mW
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	200	°C/W
Thermal Resistance, Junction to Leads	(Note 6)	$R_{\theta JL}$	71	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 5. For a through-hole device mounted on the minimum recommended pad layout with 12mm lead length from the bottom of package to the single-sided FR4 PCB; device is measured under still air conditions whilst operating in a steady state.
6. Thermal resistance from junction to solder-point at the seating plane (2.5mm from the bottom of package along the drain lead).

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

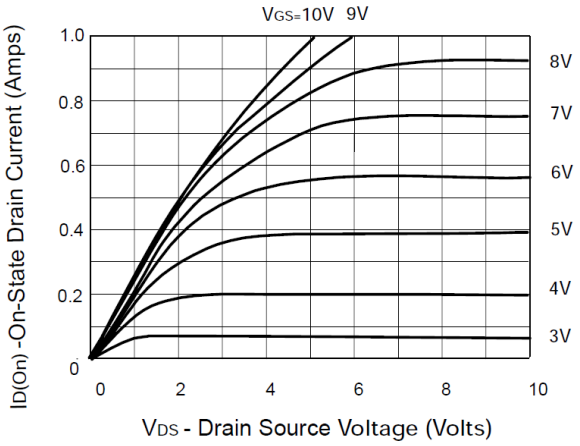
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	I_D = 250µA, V_{GS} = 0
Zero Gate Voltage Drain Current	I_{DSS}	—	—	10	µA	V_{DS} = 60V, V_{GS} = 0
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0
ON CHARACTERISTICS						
On state Drain Current (Note 7)	$I_{D(ON)}$	750	—	—	mA	V_{DS} =15V, V_{GS} = 10V
Gate Threshold Voltage	$V_{GS(TH)}$	0.8	—	2.5	V	I_D = 1mA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 7)	$R_{DS(ON)}$	—	—	5.0	Ω	V_{GS} = 10V, I_D = 500mA
				7.5		V_{GS} = 5V, I_D = 200mA
Forward Transconductance (Notes 7 & 9)	g_{fs}	100	—	—	mS	V_{DS} = 15V, I_D = 500mA
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	—	60	pF	V_{DS} = 25V, V_{GS} = 0 f = 1.0MHz
Output Capacitance	C_{oss}	—	—	25		
Reverse Transfer Capacitance	C_{rss}	—	—	5		
Turn-On Time (Note 8)	$t_{(ON)}$	—	—	10	ns	V_{DD} = 15V, I_D = 600mA
Turn-Off Time (Note 8)	$t_{(OFF)}$	—	—	10		

Notes: 7. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.
8. Switching characteristics are independent of operating junction temperature. Switching times are measured with 50ohm source impedance and < 5ns rise time on a pulse generator.
9. For design aid only, not subject to production testing.

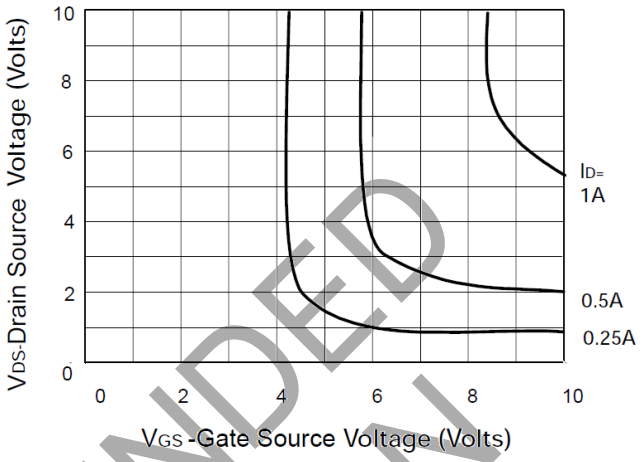
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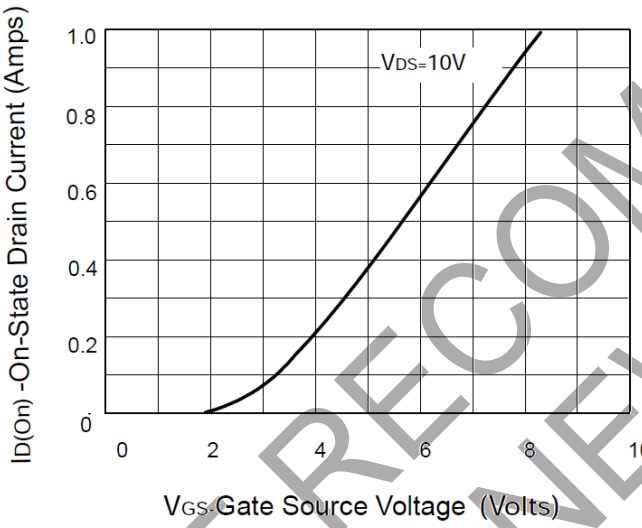
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



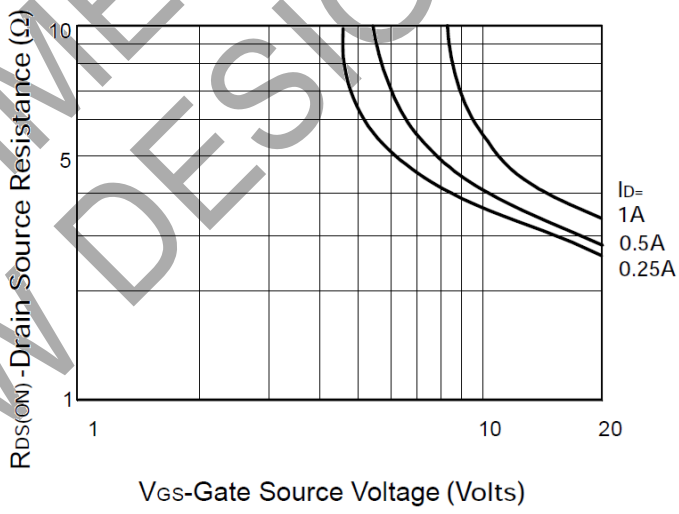
Saturation Characteristics



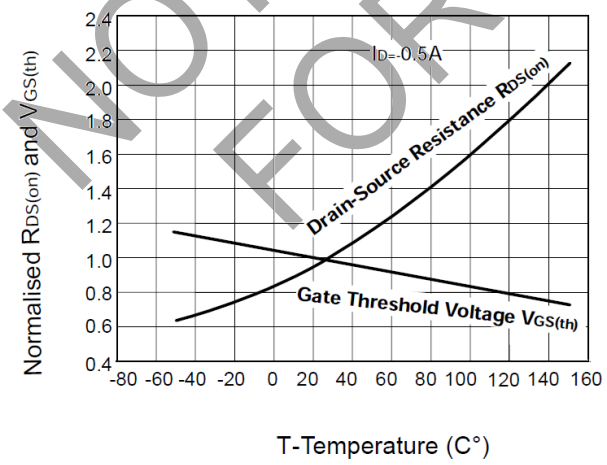
Voltage Saturation Characteristics



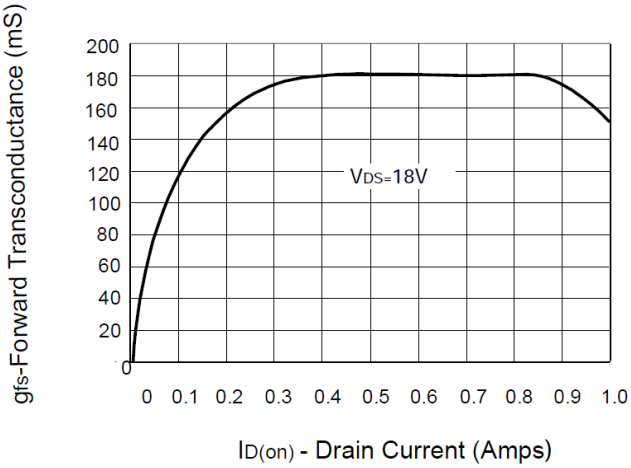
Transfer Characteristics



On-resistance vs gate-source voltage



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



Transconductance v drain current

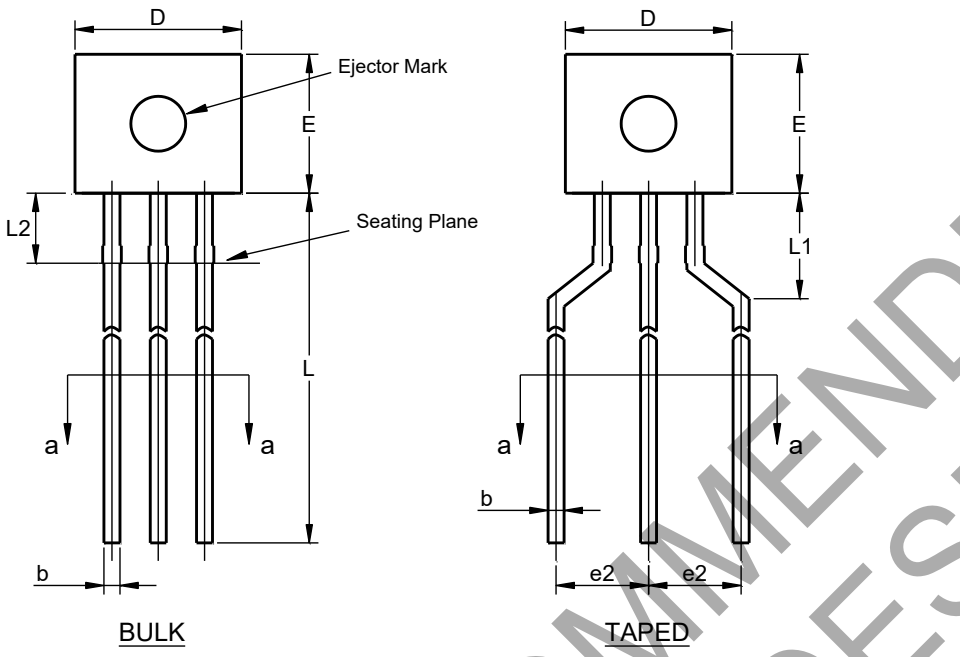
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Package Outline Dimensions

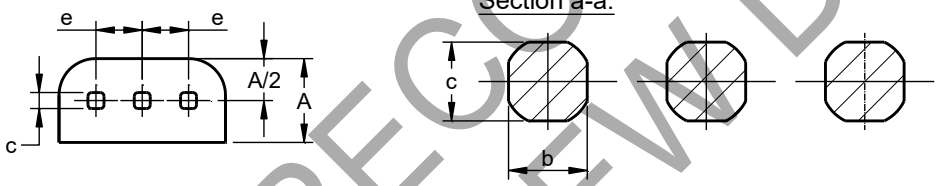
Please see http://www.diodes.com/package-outlines.html for the latest version.

E-Line



E-Line			
Dim	**Min**	**Max**	**Typ**
A	2.16	2.41	2.28
b	0.41	0.49	0.44
c	0.41	0.49	0.44
D	4.37	4.77	4.57
E	3.61	4.01	3.90
e	1.27 REF		
e2	2.54 REF		
L	13.00	13.97	13.50
L1	2.50	3.50	--
L2	--	--	2.50
All Dimensions in mm			

Section a-a:



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