

**60V N-CHANNEL ENHANCEMENT MODE VERTICAL DMOSFET**

**Features**

- $BV_{DSS} > 60V$
- $R_{DS(on)} \leq 5\Omega @ V_{GS} = 10V$
- $I_D = 270mA$  Maximum Continuous Drain Current
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

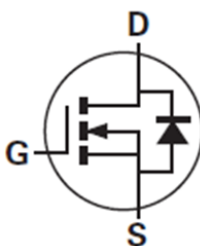
**Mechanical Data**

- Case: E-Line (TO-92 Compatible)
- Case Material: Molded Plastic, "Green" Molding Compound  
UL Flammability Rating 94V-0
- Terminals: Finish - Matte Tin Plated Leads, Solderable per  
MIL-STD-202, Method 208 Ⓢ3
- Weight: 0.159 grams (Approximate)

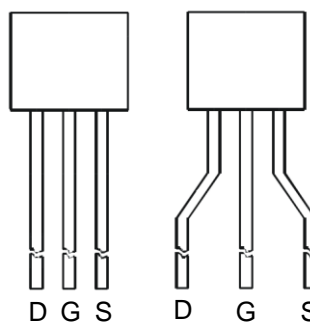
E-Line  
(TO-92 Compatible)



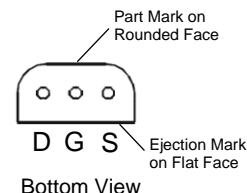
Flat Face View



Device Symbol



Rounded Face View



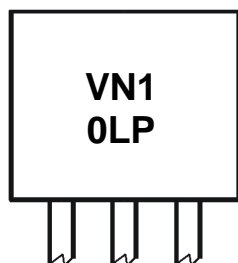
Bottom View

**Ordering Information** (Note 4)

Product	Marking	Package	Leads	Quantity
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) compliant.
  2. 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.
  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 <http://www.diodes.com/products/packages.html>.

**Marking Information**



Rounded Face View

VN10LP = Product Type Marking Code

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	60	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current	I <sub>D</sub>	270	mA
Pulsed Drain Current	I <sub>DM</sub>	3	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	625	mW
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	200	°C/W
Thermal Resistance, Junction to Leads (Note 6)	R <sub>θJL</sub>	71	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

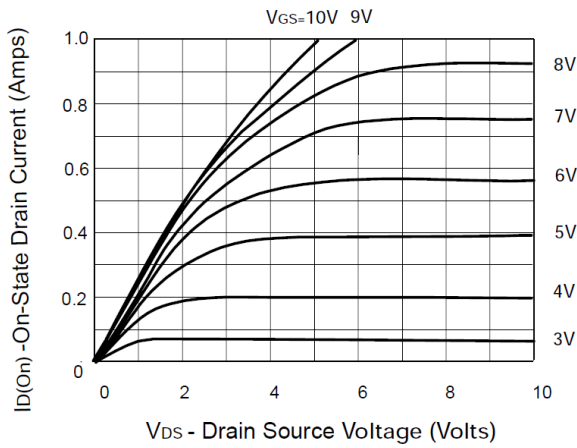
- Notes:
- For a through-hole device mounted on the minimum recommended pad layout with 12mm lead length from the bottom of package to the single-sided FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  - Thermal resistance from junction to solder-point at the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

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

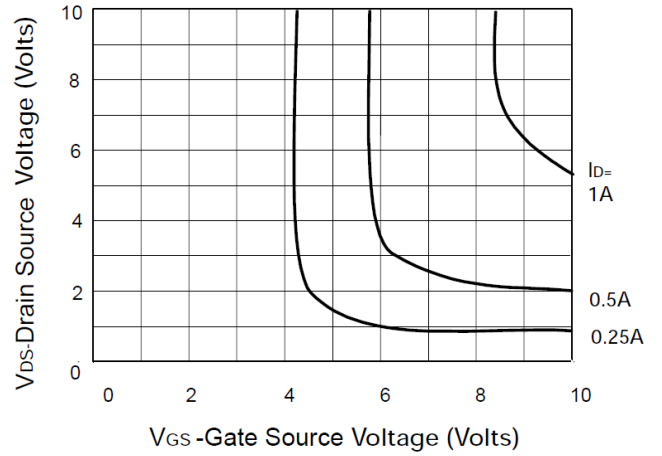
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	10	μA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
On state Drain Current (Note 7)	I <sub>D(on)</sub>	750	—	—	mA	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.8	—	2.5	V	I <sub>D</sub> = 1mA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 7)	R <sub>DS(on)</sub>	—	—	5.0	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 500mA
				7.5		V <sub>GS</sub> = 5V, I <sub>D</sub> = 200mA
Forward Transconductance (Notes 7 & 9)	g <sub>fs</sub>	100	—	—	mS	V <sub>DS</sub> = 15V, I <sub>D</sub> = 500mA
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	—	60	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	—	25		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	—	5		
Turn-On Time (Note 8)	t <sub>(on)</sub>	—	—	10	ns	V <sub>DD</sub> = 15V, I <sub>D</sub> = 600mA
Turn-Off Time (Note 8)	t <sub>(off)</sub>	—	—	10		

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

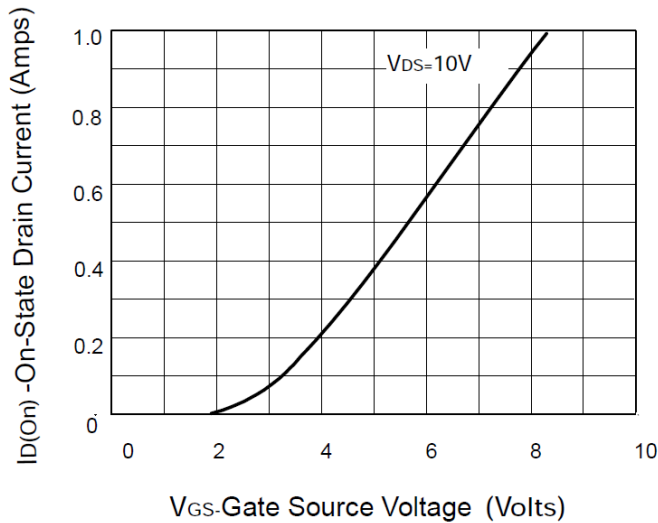
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



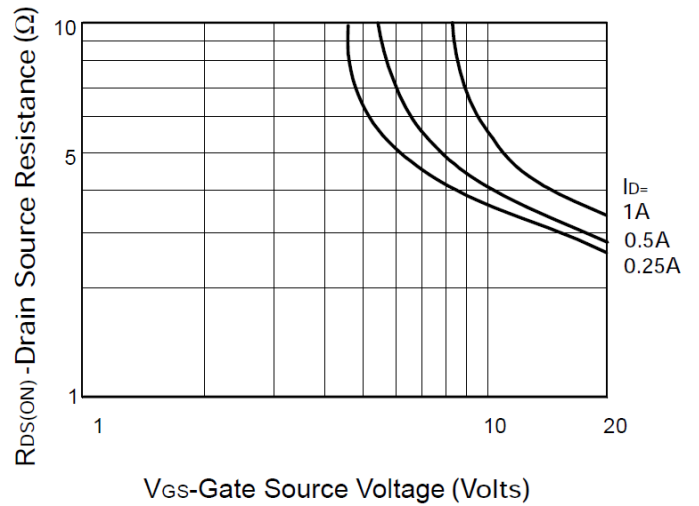
**Saturation Characteristics**



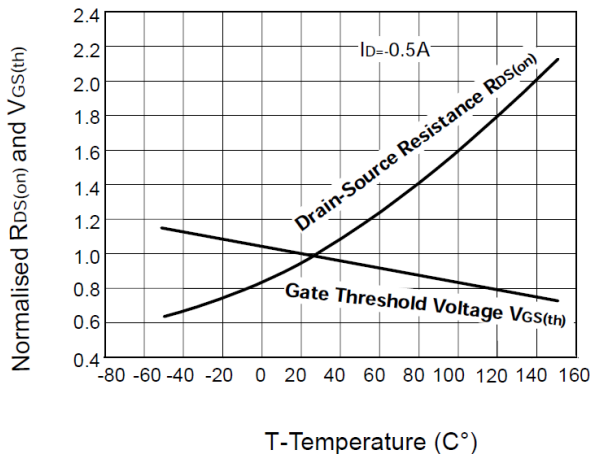
**Voltage Saturation Characteristics**



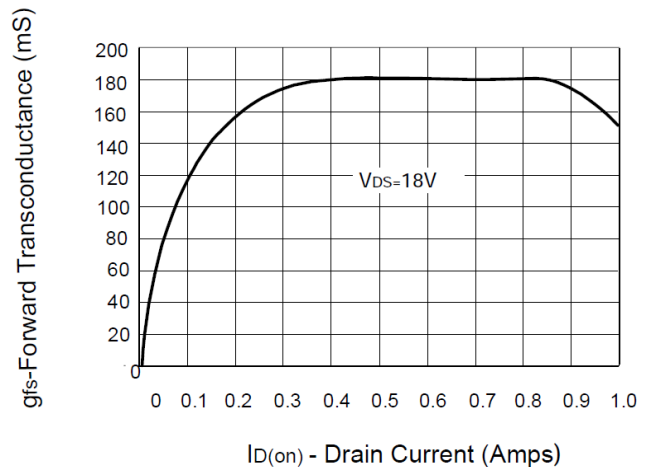
**Transfer Characteristics**



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



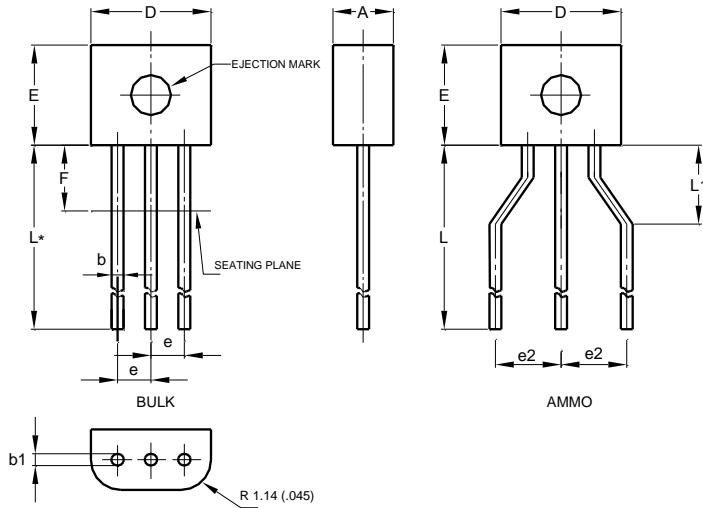
**Normalised  $R_{DS(on)}$  and  $V_{GS(th)}$  vs Temperature**



**Transconductance v drain current**

## Package Outline Dimensions

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



E-Line			
Dim	Min	Max	Typ
A	2.16	2.41	—
b	0.41	0.495	—
b1	0.41	0.495	—
D	4.37	4.77	—
E	3.61	4.01	—
e	—	—	1.27
e2	—	—	2.54
F	—	2.50	—
L	13.00	13.97	—
L1	2.50	3.50	—
All Dimensions in mm			

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